



Environmental Audit Committee

Oral evidence: [Action on air quality](#), HC 212

Wednesday 25 June 2014

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Written evidence from witnesses:

- [Environmental Research Group](#)
- [Sustrans](#)
- [National Centre for Atmospheric Science](#)
- [Client Earth/Healthy Air Campaign](#)
- [Government \(joint submission from DEFRA, DECC, DfT, DH and DCLG\)](#)

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Members present: Joan Walley (Chair), Peter Aldous, Neil Carmichael, Martin Caton, Zac Goldsmith, Mike Kane; Mark Lazarowicz, Dr Matthew Offord, Mrs Caroline Spelman, Simon Wright.

Questions 1–87

Witnesses: **Mike Galey**, Chairman of the Environmental Industries Commission Air Quality Working Group, **Dr Ian Mudway**, Lecturer in Respiratory Toxicology, Environmental Research Group, King's College London, **Alan Andrews**, Health and Environment Lawyer, Client Earth, **Philip Insall**, Health Director, Sustrans, and **Professor Alastair Lewis**, Deputy Director, National Centre for Atmospheric Science gave evidence.

Q1 Chair: Order, order. On behalf of the Committee I would like to thank each of you—a very distinguished panel we have this afternoon—for coming along to our follow-up inquiry to the earlier report that we did. Back in 2011 our Committee recommended all manner of measures, and it is as important as ever that we follow up on that inquiry. We want to start doing so asking each of you if you

could share with us the progress that has been made since our 2011 inquiry, perhaps with some particular reference to the figures from DEFRA, which show that air quality is getting worse, and also concerns that there are about to be cuts inside DEFRA, which might impact on their ability to be able to deal with this. Is it the case that there has been no progress, or has there been progress? Perhaps we could start by getting some measure of just how much progress there has or has not been. Who would like to go first?

Professor Lewis: We need to qualify what you mean by "progress"? In terms of an atmospheric measurement you would not use a period of 2011 to 2014 to derive a trend. So it is quite important that we don't look too closely at the data points over that very short period. Generally for a trend to be significant you would have to look over a period of 10 to 15 years. So it is better to look at the entire time series rather than focus just on that three-year period, because of the influence that meteorology has on an annual basis. Meteorology puts the bumps in the curve, if you like. But if you take the whole time series, let us say the last 15 years, we are now in a region that looks broadly flat.

Q2 Chair: Just going back to what you were saying about the three years and the blips up and down, DEFRA has changed the way that they measure air quality by doing it on a daily basis rather than on a more detailed basis. Does that have a bearing on this as well?

Professor Lewis: You have to go back and make sure we are comparing like with like. If it degrades the time and resolution, for example, that you measure the data on, you have to make sure when you then go back that you essentially put everything on the same time base. In general terms it is very unhelpful to change the way you measure. It is sometimes better for some of these time series to have an imperfect measurement but be done the same each time rather than update your methodology, because that makes identifying trends very difficult. We are now in a period where the trends are very small, so you need some robust measurements, but over a long time period.

Q3 Chair: The methods have changed, have they not?

Professor Lewis: They have in terms of some of the time reporting, but of course you can try to correct historical data to make them match.

Q4 Chair: Anybody else wish to comment on progress?

Alan Andrews: Just an initial observation from me. It is quite difficult to assess what progress has been made in terms of measures,

because what we do not have is any kind of comprehensive strategy setting out what DEFRA's plan is for achieving compliance, both with the EU limit values and with the more stringent WHO guidelines. Over the last couple of years we have seen a drip feed of good news stories coming from DEFRA, but it is hard to assess how effective these measures are going to be in the absence of a comprehensive strategy, and that is what we need. It is disappointing to see that that was one of the key recommendations from the last report that have not been followed up on.

Q5 Chair: How does that fit in with the health perspective of all of this?

Dr Mudway: I would say that over the intervening period the negative health impacts associated with pollution have become more robust. We now know that fine PM, nitrogen dioxide and ozone, have more health effects than we did at the time we had the last meeting, so it has become more pressing to deal with these issues now than it was in 2010. I think it is also clear, from the WHO REVIHAAP and the HRAPIE reviews, that there are significant health effects below our limit values, and so not attaining our limit values should be seen in a very negative light. They are not a magic barrier we have to cross. They are our minimum expectations to protect public health.

Q6 Chair: Is DEFRA carrying out the necessary response to those minimum expectations?

Dr Mudway: There is, not just within DEFRA but across all of the people who have an influence in this domain, a lack of ambition to address the question. Certainly the actions we see are not in proportion to the magnitude of the problem that we face as a public health issue.

Q7 Chair: You are nodding, Mr Galey.

Mike Galey: Yes, I am. First of all, thank you for giving me the opportunity to give evidence here today. There has been very limited data published since 2011, in my view, and there is evidence that there is a small decrease in the number of zones with EU limit exceedance in 2012 and since then maybe that trend will continue.

Chair: Sorry, did you say "decrease"?

Mike Galey: I detected a decrease in the number of zones with EU limit exceedance—that was in 2012. I am not quite sure how things have progressed since then. But I do think there are short-term problems. There are local hotspots of pollution and, as my colleagues have said, there is a lot of evidence now that things such as ultrafine

particles and NO₂ are very problematic. We need to deal with those. What I detect from DEFRA so far is that they concentrated a lot on long-term strategy, decarbonisation of the fleet, maybe dealing long-term with alternative vehicles. But that cannot come without getting to grips with the problem that is here now, today, and that is dealing with those hotspots of pollution. The only way we can do that is by dealing with the existing fleet. Fleet renewal takes a long time, and therefore a lot more could have been done in cleaning up the existing vehicle park, and that largely means diesel vehicles—urban diesel vehicles such as public transport buses.

Q8 Chair: You say a lot more could have been done. Whose responsibility would you see it as being: are you talking about BIS, in terms of consumer and used vehicle standards, or are you talking about the Department for Communities and Local Government? How do you see the response that is needed for the hotspots, particularly those that have been referred to, being co-ordinated by Government from a top-down level?

Mike Galey: It is quite difficult. In the conversations I have with Government, DEFRA largely appreciate that there is a problem but are woefully short of funds and resources to deal with the problems. DfT are aware that there is a problem. It is a case of directing funding to the right place. Hundreds of millions have been invested in promoting alternative vehicles—vehicles for the future, which will come and will be good and will be good for the atmosphere, for the environment, for health, but in the short term some of that fund, I believe, should be redirected towards cleaning up the existing vehicle park. The money involved, compared with the money that has been invested in the long-term solution, is relatively small and we can do it today.

Q9 Chair: How is that then affected by the Sustainable Transport Fund? Would that be a fund that would help in some way with that?

Mike Galey: The problem is that when you use the word “sustainable”, that means different things to different people. I am talking principally about air quality and about emissions of particulate matter and NO_x from the existing heavy-duty diesel vehicle park. If I said to you, “Here is a technology that has proved to be cost-effective and cost-beneficial, which can reduce particulate emissions from a diesel vehicle by 95%-plus, reduce NO_x by 95%-plus, and reduce direct tailpipe emissions of NO₂ by 95%-plus”, why not invest in that sort of technology?

Chair: Why not, indeed?

Mike Galey: Recently DfT gave TfL £10 million to invest in cleaning up 900 buses using just that sort of technology. We have recently heard about the Clean Vehicle Technology Fund, which allow local authorities to bid for monies to do just that sort of thing, and that was £7.5 million. £7.5 million is a lot to you and I but to Governments £7.5 million is a relatively small sum. Therefore I think more money should be directed into that particular type of activity whereby the existing vehicles on the road can be cleaned up as soon as they are retrofitted.

A typical bus has a life of 15 years, so all the Euro 3 buses that went on the road between 2000 and 2006 are still there. We know that we can clean up a Euro 3 bus and make it better than Euro 5, and really better than Euro 5—not the notional Euro 5, however it may operate—and approaching the Euro 6. So if we can do, that why should we not do it? There are 40,000 buses and 30,000 coaches on the road still. 40% of those are Euro 3 and could be addressed as soon as the funding is made available.

Q10 Chair: In terms of access to a fund that might be there to deal with that, would you see a case for ring-fencing it for those areas where there were hotspots of particulates?

Mike Galey: Absolutely. That is where we should start. As you are also aware, EIC is pressing for a national framework for low emissions zones, and what we want to do is to make sure that vehicles that are more pollutant are not just shifted from one place to another. The problems that Sheffield faces are also faced in Rotherham, Leeds, and York, and therefore what we need is a common playing field, so that all urban vehicles in each of those cities are made as clean as possible. For that we need a national framework with the ability for local government to take local action to address their local problems.

Q11 Chair: We will come on in a little bit more detail to traffic emissions, but I am conscious that we should ask you, Mr Insall, if there is anything that you wish to comment on in terms of DEFRA's progress over the last three years, particularly in view of the consultation that they currently have.

Philip Insall: I would honestly pass on DEFRA. The key points have already been made—that this is a cross-governmental and interdepartmental problem. I would like to pick up—I am not sure if this is the moment, stop me please if it is not—on some of Mr Galey's comments.

Q12 Chair: On the transport and the active transport policy? I think we have covered—

Philip Insall: On the use of the LSTF, the Local Sustainable Transport Fund, and the role it has played—I may have the terminology slightly wrong. We need to concentrate on the fleet we have. One of the things that we could clearly be doing much more of, and which the Local Sustainable Transport Fund allowed us to pilot at a scale that previously was not possible, is reducing the need for people to use private motorised transport or even public motorised transport. So the LSTF was the first significant multi-year, perhaps not ring-fenced, but dedicated and directed investment programme that we have had, and it is ending, and at the moment there is no plan to replace it.

Q13 Chair: We will get on to that just a minute. But why do you think there has been a worsening in the three years since 2011? What is the reason behind it in terms of air quality?

Alan Andrews: Lack of political will is the main reason.

Chair: Lack of political will, yes.

Professor Lewis: I think a lot of the technologies that have been proposed have not performed in the manner that we expected.

Q14 Chair: The technologies have not performed. So it is not to do with the investment in the technologies, it is just that technology has not performed.

Professor Lewis: It is combination of the two. The investment has been modest, although if you say that everybody who buys a new car is making an investment in new technology and some of those technologies have not performed, I think there is a lesson there about any technology that we choose to adopt. If it is a short-term fix that we are absolutely convinced it is going to do the job in the field, that is one thing, but I think we have been burned a little bit by enthusiastic people with data in the lab that has not found its way into our getting any real-world benefits from it.

Philip Insall: Business as usual.

Chair: Business as usual, okay.

Dr Mudway: I would just like to reinforce the comment about the technologies not performing in the real world and the idea that the solution to these problems has some imminent technological fix. I think the last 10 years has indicated to us that the technology has not delivered. We have known for quite some time, even over the last three years, that it has not been heading in the right direction.

Mike Galey: If I could endorse that comment, we all hoped that Euro 4, Euro 5 and Euro 6 vehicles would help to remedy the problem, and certainly all the evidence is that Euro 5 vehicles are not performing as they should in the real world.

Chair: We will come to that shortly.

Dr Mudway: One of the issues is about a modal shift. If we want to tackle our problems, which are diesel-related, we should start thinking about gasoline again. We have cleaner vehicles with low NO_x and NO₂ emissions and lower particle emissions, and the newer generation of gasoline vehicles have no penalty in terms of CO₂. They are equivalent. So we are effectively pointing our car ownership scheme in the wrong direction, and that fiddling round at the edges is not solving our air quality problems.

Q15 Martin Caton: Have there been any significant changes in the scientific evidence on the health effects of air pollution since our 2011 report?

Dr Mudway: I should probably speak to that, because I was part of the REVIHAAP review process. There has been a lot more evidence and the evidence has become more coherent, so there is no question now. Marked effects on mortality from fine particles have been shown across European multi-city studies, American multi-city studies and even Asian multi-city studies. So that number and the risk associated with it has become more robust over time.

We have also found effects on infant mortality rates, on pre-term birth and on cognitive performance in children. There is some interesting data emerging on traffic proximity, diesel emissions and potentially autism spectrum disorders. There is a wealth of new data, and I suspect that within the actual REVIHAAP process one of the key issues was about nitrogen dioxide. There was a feeling that nitrogen dioxide maybe was the weakest of our limit values, and that maybe it was a surrogate for something else within near traffic.

In 2005 there was a limited database. In 2012 the database is so strong. The epidemiology is incredibly strong for morbidity and mortality effects with NO₂. Even in models where you control for particles or carbon black or particle number concentrations, the NO₂ is robust. It has a health effect on its own right. So the NO₂ exceedances across London mean something. They have a health impact. I do not think that is questionable any more, and that is a major modification in our thinking over the last four years.

Q16 Martin Caton: We have had written submissions pointing to possible links with brain damage in children and with neurological conditions like Parkinson's. Is that robust research?

Dr Mudway: It is an emerging area. For example, there is quite a lot of evidence on cognitive decline. The pollutants vary—sometimes it is associated with fine particles, sometimes it is associated with NO₂—but the interesting thing, which I think raises a warning flag, is that many of the studies where people have shown associations between traffic pollutants and cognitive declines are in countries that have relatively low penetrants of diesel vehicles. These studies are coming from the USA, so if you show these effects robustly within the USA then you have to speculate how they would map on to a British urban population with their very high NO₂ concentration.

So within my centre we have people who are actively trying to take up this question and apply air pollution models to cognitive performance in urban populations, but we are at that point where a flag has been raised and you will find, as with many things in air pollution research, that in five years' time what was a flag has become something that we are confident about.

Q17 Martin Caton: That is a good example of a priority in your research. Is there anything else that should be prioritised now?

Dr Mudway: I think that sometimes we become preoccupied on mortality. My particular area of interest is in children's respiratory health. The evidence over the last three or four years that children growing up near traffic in areas with high NO₂ and primary particle emissions have stunted and impaired lung development is incredibly strong. Back in 2010 there was an HEI report that very critically looked at the evidence-based traffic data, and at the time it said there was a suggested link between impaired lung capacity in children and traffic pollution. I would say in the intervening period that data has become very strong.

To give a framework for why we need to worry about the concentrations, recently we have had a whole host of integrated health studies across Europe, the Escape programme, linking cohorts from across Europe and linking them to air quality standards. The recent paper looking at lung function in children showed a reduction, but the reduction was even seen within a Swedish Stockholm county cohort. So you were seeing concentrations that were a quarter of the concentrations that we see in London. In that study, interestingly, it seemed as though the effect may be linked to the exposures that were occurring in the first 12 months of life.

So this is important. It is not just about mortality. It is about general wellness of our children as we grow, and our susceptibility and vulnerability to diseases as we progress through our life force.

Q18 Martin Caton: What more should the Government be doing in supporting this sort of research?

Dr Mudway: I think that we need a valuation. If we have schemes to lower pollution and we want to see that they have impact on health, then we want to evaluate them. So I have been involved in a study of the impact of the low emission zone in London, specifically looking at children's allergic respiratory health across time. That is vital, because you need to know if these interventions give you a health dividend—that is where the actual financial costs are. We have just finished it and we are analysing the data now to see whether there is a step change, but of course our problem is that we are looking at an effect that has been driven by reductions in PM and NO₂ concentrations, and they have not changed. Not in a simplistic way. You have to drill down deep into the data, and you can begin to pick up that the LEZ has maybe had an effect at some roadside sites on primary fractions of PM_{2.5}, or reductions in black carbon emissions, but if you look at the things we regulate and the things for which we have associations with health, they have not changed. Again, that is because the technology did not deliver the benefits that we projected were there.

Q19 Zac Goldsmith: I will start with Mr Insall, if you do not mind. I am interested in knowing from you how viable you think the alternative fuels are at this stage.

Philip Insall: That is well beyond my expertise. What I can say is that we and others have shown that rather than using alternative fuels, it is possible to bring about fairly rapid changes in people's travel behaviour and at fairly significant scale.

May I be the first to mention co-benefits? We do not want to be looking at air quality in isolation from the other public health aspects of transport. This is primarily a transport problem, so the type of intervention we are in favour of delivers benefits in road safety, climate emissions, physical activity and social integration—I am probably missing something.

Q20 Zac Goldsmith: I am going to move on, but I take the points you have made. Does anyone else on the panel want to volunteer to attempt that question?

Professor Lewis: I will comment on the fuels, because I find that I am inherently more enthusiastic about the use of fuels that do not produce anything harmful than the retrofitting of technologies to

hydrocarbon-based fuels. I am not a spokesperson for any of these, but hydrogen is a reasonable energy-dense fuel. You can store it. I have some enthusiasm that that is a fuel that has some prospect, and I would rather see some effort placed in those sorts of areas rather than sticking plasters, if you like, over the continued use of diesel and gasoline.

Q21 Zac Goldsmith: Technologically, do you think that is realistic? You would put your finger on the hydrogen alternative—that would be your fuel of choice?

Professor Lewis: I am a chemist by background. Hydrogen is reasonably energy-dense. I understand it. I can put it in a bottle. If I brought it here and came back a year later, it would still be in the bottle. I know there are other alternatives, but I am not going to say anything about those because I do not know much. We have adapted to using gasoline and diesel quite extensively, and they are very energy-dense fuels, but we do not use hydrogen peroxide rocket fuel, for example. So we have adapted our technologies not necessarily to always use the most energy-dense fuel available. There are some trade-offs if you move down to hydrogen as an alternative.

Q22 Zac Goldsmith: Mr Galey, obviously it is not just about the cleanliness of the fuel—it has to work. The economics have to stack up as well. What would be your view in relation to these alternative, cleaner fuels?

Mike Galey: Personally I think we clearly have to move towards cleaner fuels, but at the moment diesel is a prime automotive power. If we are looking at CO₂ and global warming issues, diesel is going to be around for a long time and is still a very efficient mover of heavy-duty transport. The only question is how to make it cleaner, and the technologies are available for that.

I was thinking back as we were sitting here. 20 years ago—I can remember that far back—we commissioned some studies at Millbrook proving ground, where we compared what was considered at that time the best available diesel technology with the best available alternative fuel technologies, and emissions from the two were similar. As the two have developed side by side, in round terms I believe that is still the situation. The cleanest available diesel vehicles with correct technology working in the real world are around as clean as compressed natural gas and some of those alternative fuels. In the longer term, certainly we need fuel cells and hydrogen, but for the moment we have to make the best of what we have.

Q23 Zac Goldsmith: So the retrofit—is that your quick win?

Mike Galey: I am afraid it is. I am sorry to say it again.

Q24 Zac Goldsmith: Not developing new fuels. Can I ask you to go back to a point you made earlier about the Euro 3 vehicle? I do not know if anyone else is coming to this, but you said there are 70,000 buses—

Mike Galey: And coaches.

Zac Goldsmith: —at that class. What would it cost to retrofit those vehicles, per vehicle?

Mike Galey: If you spend, in round terms, £10,000 per vehicle—not an insignificant amount, but it is still cheaper than a new vehicle—you can take a Euro 3 vehicle to better than Euro 5, approaching Euro 6. But not only that, if you retrofit that Euro 3 vehicle with a combined diesel particulate filter and selective catalytic reduction, which is just the technology used in the Euro 6 vehicle, then the ultrafine particle emissions from it will be one hundredth that of a Euro 5. So you put a Euro 3 retrofitted and a Euro 5 new vehicle side by side, the Euro 3 retrofitted will have one hundredth of the ultrafine particles.

Zac Goldsmith: That is for £10,000?

Mike Galey: That is for £10,000 per vehicle.

Q25 Zac Goldsmith: Do you also achieve energy efficiency on the back of that, or is it the same?

Mike Galey: There is absolutely no change in energy efficiency. It is basically just to clean up emissions.

Q26 Zac Goldsmith: So there is no payback? The payback is in terms of health.

Mike Galey: The payback in terms of human health is about two years; within two years you have more benefit from improved human health than it has cost to do the retrofit.

Q27 Chair: Are you saying that Euro 5 is worse than Euro 3 retrofitted and upgraded?

Mike Galey: Yes. There is a very simple reason for that, which if the Committee has time I am very happy to explain.

Q28 Zac Goldsmith: I do not know whether you want to submit that in writing, but I am interested in pursuing that.

Mike Galey: Basically, the vehicle emissions limits tightened from Euro 1 to Euro 2 to Euro 3, 4, 5 and 6. Up to Euro 3, the engine manufacturers were able to achieve those limits within the engine. With Euro 4 it got more difficult. With Euro 5 it got much more difficult, so the engine manufacturers had to use two techniques—EGR, exhaust gas recirculation, and SCR, selective catalytic reduction.

The test cycle, the European transit cycle, was used to test, prove and homologate engines. Those technologies worked absolutely fine on the test cycle, but it was proved later that the test cycle was far from representative of real urban driving. So if you take an engine that has been developed for a large truck in a test cycle and you put it in a bus operating in a city centre, it is not going to perform as it was performing on the test cycle. You will produce far more emissions. In particular, the strategies that are used for injecting urea for the selective catalytic reduction process will not work, by in large, in an urban environment on the engine as supplied. So you will get much higher emissions. NO_x can be three times what it was on the legislative cycle.

If you retrofit a Euro 3 you use the same technique. You use selective catalytic reduction with a particulate filter. You tune and hone your injection strategy, so you only inject urea when you need it and you tune the whole system to work on an urban vehicle operating at a speed of seven miles an hour, or whatever it may be. Therefore, it is very directed, very focused on a particular application—the urban bus. If I get no other message over here today, probably my one plea would be: please can we start with the urban buses already out there? They are prime candidates.

Q29 Zac Goldsmith: If you could push a button and have the 70,000 retrofits paid for, organised by central Government, how big a contribution would that make in terms of the national problem we face with air quality?

Mike Galey: I have not done the calculation. I apologise for not knowing the answer to that but I will think about it while other people answer questions.

Q30 Zac Goldsmith: Can you allude to it without giving me a figure? How big a deal would that be in terms of—

Mike Galey: It would be an enormous contribution, because urban buses, as our colleague said, are a big problem. But by definition, roadside emissions are affected by urban buses on our streets. I see it in Oxford Street or Marylebone Road or wherever it may be. Urban buses are a big part of it. Actually, in London they are not so much, because the Mayor did something about them many years ago. But much more can be done across the UK.

Q31 Zac Goldsmith: I am going to go back to what I was talking about earlier, because I sense a bit of reluctance on this from the panel. You made a very compelling argument, but is there anyone on the panel who believes it should be a priority to develop or roll out the alternative fuels, the cleaner fuels? Is that something that ought to be—

Professor Lewis: If I was going to be making my investments I would prefer to see it into forms of motive power, if you like, that were inherently clean to start with.

Q32 Zac Goldsmith: Commercially, then, what is slowing that process down? Is it the slowness that has caused the reluctance among the rest of the panel? Is that what it is? Do you think it is not within our grasp at this stage? I am surprised by the general—

Dr Mudway: My reluctance is because I am thinking, but it is also because we are focused on the tailpipe, and even if you had no tailpipe emissions you would still have particulate emissions coming from your vehicles, and in urban areas they are not insignificant contributors. If I look at particulate matter, concentrations in London that should have gone down have generally stayed flat. That is because the exhaust emissions have fallen a bit but there has been an increase in tyre wear abrasion and the brake wear abrasion, the metallic components from engine components and the re-suspension of dust. As vehicles have got heavier that has become a larger component. Even if you have your cleaner fuel you still have the issue that your car will make pollutants.

Q33 Zac Goldsmith: Through wear and tear, through erosion?

Dr Mudway: Through wear and tear. Cleaner vehicles, if we get to them, are good, but the zero-emission car? I always smile when I see that idea, because there is no such thing. They will always contribute to particulate pollution, which is why the idea of thinking about intelligent cities and modal shifts in transport and designing cities so that people can move through them without an over-reliance on those vehicles is the way to deliver quick results.

Q34 Zac Goldsmith: One more effort to bring this back to cleaner fuels as a priority. I do not want to force this upon you, Professor Lewis, but I interrupted you halfway through your answer.

Professor Lewis: Yes. I think we have to be careful. I understand one of the recommendations from this group last time was that there ought to be more joined-up thinking between different Departments. Of course we are here talking purely about air pollution emissions, and one of my enthusiasms is for technologies that do not release, for

example, particulates, if I take the case of hydrogen, because you do not release CO₂ as well. You have to factor in all of these areas where there is an impact on the environment, not just the air pollution one.

So what has been said is absolutely right, which is that if you introduce a cleaner fuel, you do not do away with the problem of air pollution. But you make an improvement to it, and you also potentially make an improvement in some other areas as well. People might argue, for example, that if you used fuel cells, you would have a reduction in noise. If you have sat outside the building here, noise is enormously high. Fuel cells do not produce as much noise. There are a number of different areas, and I would hope any technology was treated in the round in terms of the benefits that it might produce.

Q35 Zac Goldsmith: Thank you for that. The last point relates to electric vehicles and hybrids as opposed to the cleaner fuels. That technology already exists. We had a demonstration at Parliament Square a couple of months ago, a very, very impressive array of hybrid and pure electric cars. The pure electric cars as I told would have cost—my colleague Caroline Lucas is not here—£1 to get from here to her constituency and probably coming back again on one charge. The battery power is there and the vehicles and the technology are there. How much of a role could electric and hybrid vehicles play, do you think, in solving this issue? How important are they? I am looking at the panel as a whole, anyone that wants to volunteer an answer. Would you give me the same answer to the answer you provided in relation to clean fuels?

Mike Galey: I think they have a role, of course they have a role, and we just have to make sure that they are commercially viable and that the charging infrastructure for electric vehicles is in place and properly supported, of course.

Q36 Zac Goldsmith: What is the single biggest thing the Government can do to help that process speed up?

Mike Galey: I suspect it is to promote awareness. There is money being spent on awareness, but even more could be done, I believe, to encourage people to take up those vehicles.

Q37 Mrs Spelman: You mentioned the charging infrastructure. That of course is about capacity of the grid to cope with us all plugging in our electric cars when we get back from work for the eight hours that they need to be charged up overnight, which we have been told the grid cannot cope with. Do you see that as the major pitfall with

electric cars and the reason why the manufacturers are not going all out for it, because they know that there is a problem, that if Acacia Avenue all come back from work at the same time and plug in, only one or two residents in Acacia Avenue are going to be able to drive their electric vehicle in the morning? Is that—

Mike Galey: Personally, I would not claim to be an expert in that area, I am afraid. Others may know a lot better.

Professor Lewis: I would anticipate that the problem at the moment is the cost of producing the batteries and the technologies. I doubt that is one of the things that is concerning Toyota or Honda at the moment.

Alan Andrews: Just one final point: in terms of prioritising and cleaner fuels, I think it is worth emphasising the role of diesel in this problem. The NO2 compliance problem we have—let us not forget that the UK is not projected to comply with nitrogen dioxide limits until 2025—is overwhelmingly a diesel transport problem, so if there is one priority here, it is tackling diesel emissions. There are two things we have to do: first, we have to deal with the diesel that we have on our roads currently. We think that is through a national system of low-emission zones where you force vehicles to be retrofitted in the way that Mr Galey has described. But we also need to slow the process of dieselisation and stop the growth in new diesel vehicles, which is contributing to the long-term direction of this problem.

Chair: We will move on for the time being to public awareness.

Q38 Peter Aldous: I just want to explore the public awareness issues a little bit further. The main substantive question is: is enough being done at Government and local government level to ensure that there is public awareness of the risks of air pollution? The Government have highlighted their use of social media and apps, and they point to the smog event of April 2014 as being a success in that respect, in raising awareness. Dr Mudway, you might want to kick off here, because I think you have said that, as far as you are aware, there have been no new public awareness campaigns since this Committee last reported in 2011.

Dr Mudway: I think that is in my department's submission, just to be clear. I think certain things have happened that are beneficial. I do a lot of outreach activities and public engagement, and therefore I can say that over the last four years, there has been a sea change in the public's attitude towards air pollution. They now seem to understand facts, and they are interested in it. The question, I suppose, is: do we get the relevant information to those people? Clearly in my department we have a series of apps that people can have on their phones that tell them air

pollution information and allow them to work out ways of navigating through the urban environment to reduce their exposures.

That is going on, but one of the big problems we have in public understanding is getting across to them that this is such a big problem when they do not see central Government doing anything about it. It is like, "If this was such a big problem, surely we would have information coming to us from central Government". So the idea that we are being given money to do this on a localised level creates pockets of understanding, but it does not really get the message across to people that this is our No. 1 environmental public health issue. Currently, I think we have kind of a mismatch. People want to know this information.

The London Saharan dust episode, that big thing, was so telling for us, purely because there was nothing exceptional about that episode. There had been two episodes even greater than that in March, and there had been no public dissemination of that information to the general public. It was simply that the Met Office had integrated the air pollution forecast into the weather, and suddenly that is a huge thing, because that is now going to people in their houses via television. But the mass of the general public just have not really been getting information in the round. It has been done in a rather sporadic fashion.

Q39 Peter Aldous: Any other comments?

Professor Lewis: I think it has been an important move that the forecasting of this and dissemination to the public is now going through the Met Office. That is a very positive thing. I think they are the best people to do that, but what was telling with the last air pollution, the Saharan dust episode, was that having told people that there was an air pollution problem, there was no advice to go along with that. In fact, if you went to the DEFRA website, you would have found nothing to help you out. It seems that there is a perfect vehicle there for trying to encourage behaviour change.

It is not the Met Office's job to invent what that change ought to be—I have some sympathy with them—but if we have people's attention in a way that we have not had their attention before by giving these forecasts out after the 10pm news, there ought to be some useful information disseminated with it, even if it is simply encouraging you not to take your car to work. There is a lot that could be done now that there has been this shift in how we give the information out.

Philip Insall: I think it is probably a good idea to split communication and public awareness into two subsets. There is what happens in the case of a terrible event, and how we notify people and offer those most at risk some form of protection, but there is the bigger picture of public awareness and understanding, which leads to a

willingness to face the measures that will be necessary to address the problem. In that latter case, I would agree with you about the Met Office, but I would also mention Public Health England, the Government's public health agency, and the report it published six or eight weeks ago, splitting the impact of air quality on premature mortality down into local authority areas. That is quite an inspired approach, which PHE has also taken in other fields, because it allows local media, which reaches lots of people, to treat the matter in a certain way. That is a good way of getting things into the public awareness, because it becomes, "Oh my God, we are even worse than so and so". It may not necessarily be the only useful measure of the impact, but it is a way of getting a public debate about the subject, and we need more, I would suggest, of that.

Alan Andrews: I think the Government's overall approach on this is quite misguided. It is based on the principle that they want to focus notifications and warnings on the most vulnerable people and they do not want to alarm the general public who are not at risk. I am saying that is misguided if you think of the groups of people who are at risk: people with asthma, people with a record of heart disease or stroke, older people. It is a huge subset of the population, so in many ways, the only way to ensure that those people are all warned adequately is to warn the general public and get the message out there to as many people as possible. But DEFRA seem at pains to make sure that does not happen, and in some ways really keep this problem under wraps. As I think Philip said, there is going to be this two-way benefit—not only will you warn the vulnerable people, but you will also build support for the measures that we are going to need to tackle this problem.

Q40 Peter Aldous: I was going to come on to you, Mr Andrews, and just explore whether there should be any additional support given to raising awareness among vulnerable groups such as those with asthma. You are saying that probably that it needs to be more general, and that will get across, rather than concentrating specifically on vulnerable groups.

Alan Andrews: I think so. One statistic that comes to mind is that there were 1.6 million asthma attacks recorded during the April smog. That is a large number of people. I think there is also a worry that relying on social media, text messages and these sorts of things to warn vulnerable people really risks missing out those people who do not have smartphones and do not use Twitter—older people, lower income groups, those who we know are the most vulnerable to health effects.

Q41 Peter Aldous: How should we be getting to those people?

Alan Andrews: We should be as used to seeing information about air pollution on weather forecasts as we are seeing pollen warnings, UV warnings and all these meteorological and environmental factors, which have much lower health effects than air pollution. I do not understand the

Government's reticence to get that information out there to the general public.

Q42 Peter Aldous: Is it exclusively a role for Government and for DEFRA, or does local government have a role?

Alan Andrews: The legal responsibility rests with the central Government, but I think there is also a big role for local authorities to play here as well.

Q43 Peter Aldous: Are there any case studies of local authorities who are getting it right?

Alan Andrews: Not that I am aware of, but it is not my specialty.

Q44 Peter Aldous: We will find out in September whether there is a local authority getting it wrong, perhaps.

If I can just come on to Mr Insall, my final question is, how successful do you think the citizen science-style type of projects have been in raising public awareness of air quality and pushing it up the public agenda?

Philip Insall: Sorry, which style?

Peter Aldous: The citizen science types of projects. How successful do you think they have been?

Philip Insall: I could not comment. I have nothing to say about that, I am afraid, sorry.

Dr Mudway: I have worked with them and advised them, and I think that it is incredibly useful. It is a way of people immediately engaging. I have seen people sticking NO₂ diffusion tubes next to their children's school and recording levels that are very high. Then the only danger is that people run with that data without sitting down with the experts and interpreting it correctly, so they get snapshots, not the long-term story. But in terms of getting people in communities thinking about roads and traffic and levels and potential impacts on their health, it is invaluable.

Q45 Neil Carmichael: In connection with Peter's questions, one organisation we do not appear to have mentioned yet is the Environment Agency, which has responsibility for the issuing of permits and the monitoring of permit holders in terms of air pollution. Do you think that is an adequate role for the Environment Agency and, as an extension to Peter's question, do you think that it should be held responsible for air pollution warnings, a bit like flood warnings?

Alan Andrews: I would refer the Committee to the submissions on this, I think to the first inquiry or it could have been the second, where we recommended that the Environment Agency be given responsibility for just those sorts of things. The problem we have is that DEFRA is responsible for achieving compliance with limit values and also responsible for issuing smog warnings, so there is obviously a conflict there where they will not want to embarrass themselves.

Q46 Neil Carmichael: Yes, because DEFRA are not responsible for permits and they are not responsible for monitoring the performance of permit holders, which was the original question I asked, so you are obviously saying that is not enough.

Alan Andrews: There would be enormous value in having an independent body such as the US Environmental Protection Agency, which is impartial and independent from Government, supervising the issuing of smog warnings and monitoring compliance with limit values and public communication.

Q47 Chair: But that does not quite address the point that Neil Carmichael was making about the permitting and licensing role that the Environment Agency has. We are not talking about transport specifically, but we are talking about other operations likely to produce particular problems. Shouldn't there be some way of integrating that into policy making?

Professor Lewis: Yes, it is an unusual position that point sources are the responsibility of one agency and mobile sources are not really anybody's responsibility to check. I think this is one of the reasons why we are in the position that we are in with underperformance on control technologies. If you take a power station, which is the ultimate NOx emitter, its performance will be very heavily scrutinised. There will be measurements made, it will be monitored all the time, and the measurements will be returned to the Environment Agency to prove that power station is emitting what it says it emits. But there is no parallel system for that with road transport, for example, so I guess I would say that if there could be a role made for someone to take on that job—to audit in the field the performance of some of these individual processes—we might not be in the position we are with repeated failures of various Euro emissions. I think that is a consequence of having this unusual division of responsibilities.

Q48 Neil Carmichael: Dr Mudway, do you concur with that at all?

Dr Mudway: I do, and I think the technology exists so that you could really do it with remote sensing technology. You could have remote sensing examining the performance of vehicles of different Euro classes in the field, and based on that, you could have permitting. I think that would work. The technology exists.

Q49 Chair: Just before we move on, can I just go back to the point that Peter Aldous was making about the citizen science projects, and how to get across the extent to which people are vulnerable to poor air quality and how to link that to awareness? Do you think that there would be any merit in, for example, members of this Committee somehow or another

monitoring the air quality as we go about our work in this inquiry, just to raise awareness of one kind of another?

Dr Mudway: If members of the Committee would like to have personal monitors to see what their exposures are, I am sure we can arrange it.

Neil Carmichael: That would be really interesting, that would.

Chair: We will give some consideration to that.

Neil Carmichael: I will go along with that. Free of charge?

Dr Mudway: I think so. We do quite a lot of lot of it, because it is a very important question.

Chair: Absolutely.

Dr Mudway: When we talk about health, we have this issue of what people breathe, and of course we generally estimate it based on a residential address, or we may weight it. But getting information about people's movements and what their true exposures are is vital to refining our risk estimates.

Neil Carmichael: That might be a bit too much information, but that will be interesting, yes.

Chair: We will give some consideration to that.

Neil Carmichael: I would do that.

Philip Insall: Can you link that to GPS? Can you track it against the environment?

Dr Mudway: We would know exactly where he had gone.

Chair: Maybe it will raise awareness.

Dr Offord: I am just worried that the air quality in Stroud is probably better than it is Hendon.

Neil Carmichael: I am very proud of the air quality in Stroud.

Q50 Dr Offord: So you should be, so you should be.

Clearly the way to reduce air pollution would be to decrease the amount of travel that people undertake, particularly through vehicle use. If you consider Parliament Square, people have a choice of using the bus or the tube or possibly walking or using even the Boris bikes, but the promotion of that active kind of travel is a very difficult behaviour change in people. How do you think that should be promoted?

Philip Insall: There are a whole range of proven, very effective and very cost-effective measures. Environmental interventions include things like the congestion charge scheme, which in fact is a really interesting public health initiative. There is the reallocation of road space—a number of London boroughs have taken space away from motor vehicles and given it back to pedestrians and cyclists, and then there is a whole range of behavioural techniques such as things like personalised travel planning, which works across a neighbourhood and addresses households where they live and where most of their trips either begin or

end. There is a settings-based approach in the workplace and in schools. This is not a Sustrans commercial, but we now work with about one in 10 schools and we roughly quadruple levels of cycling to school in the schools that we work with. It is a bit more difficult to raise levels of walking, particularly in London, where they are not bad. So there is an array of proven interventions that bring about travel behaviour change quite rapidly.

We have done our own modelling and our target, which is getting trickier every year, is to achieve a doubling of the proportion of trips made by what we call sustainable transport, which means anything but private motorised transport. It is to roughly double it from about 40% to about 80% of all local trips by 2020. The Cabinet Office, in 2009—this is in our written submission, and I cannot remember the exact stat—estimated that of trips underneath five miles, approximately 80% could, without any unreasonable intervention, be made by walking, cycling and public transport. This is a part of the problem where we do know what the solution is and we know that it works and we know that it is extremely cost effective. The DfT regards anything above a benefit to cost ratio of 2:1 over a 60-year time frame as being good value, and a lot of major road schemes go ahead with 1:1 benefit to cost ratios or even less. With walking and cycling schemes the benefit to cost ratios are so high, using the DfT's own monitoring and assessment methodology, that it is quite difficult to persuade their scientists that the system does not have a glitch in it. They can be 10:1, 15:1 or even higher, and most of the benefit in the cost-benefit analysis comes from a reduction in various health consequences of sedentary transport.

Q51 Dr Offord: Some of the schemes you have mentioned, for example reclaiming space in the road, would be for the relevant highways authority, but who do you feel should be responsible for the promotion of this agenda? Should it be local government or should it be the national Government?

Philip Insall: Under the localism conditions that prevail, clearly the decision-making responsibility rests locally, but interestingly, it rests not necessarily only with local government. The creation of Local Enterprise Partnerships has rather changed the game. We have carried out a fairly detailed analysis of the strategic economic plans of the LEPs, and very few of them give more than a very cursory and passing mention of walking and cycling, because that is not their target. Their target is really to generate economic growth and development and create jobs at all costs. There are obviously good points about that approach, but if one of the costs is going to be a worsening of the local air quality with all the consequences that we have heard of, then maybe they need a little reframing. Ultimately, the funding is still allocated from central Government, and ultimately it is No. 10 and No. 11 that set the trends

and define what the objectives are by which the individual departments and their spending control will be measured. I guess you have to say it is over there—I am trying to point to wherever Downing Street is. It does rest at the very top.

I was thinking, as we were having the previous round of questions about raising public awareness, that there is a very select public that will really have absolute control over how we develop our towns and cities and the places where we live over the coming decades. That might be just a few hundred people centred around No. 10. The public really does need to understand how important this is.

Q52 Dr Offord: Do other members of the panel have any opinions on barriers to active travel or on what is stopping people from becoming more involved?

Dr Mudway: Sometimes, specifically in urban environments, it is because they don't think it is safe. I do a lot of work with children, and sometimes when you question why they don't, they say, "Because it is so polluted". The children understand that. They think of roads as hazards and they think of them as air pollution corridors. From the age of eight, nine or 10 we get this information. What you said is absolutely spot on, but we can give them information so that they can cycle and walk on routes that have the lowest possible pollution. We have very fine-scale air pollution modelling in our cities. We can say, "If you want to go from A to B, this is the high-pollution route, and this route may be a little bit longer but it is the low-pollution route". We can give them guidance on how to avoid exposure to traffic, and then we can quantify it with personal monitors, so we have done lots of work. Simply by thinking about how you use the urban environment when you move around it, you can shave almost 50% off your exposure to primary traffic pollutants. I think we have to encourage people to have active transport for their health benefits, but we also have to provide them with the means and the information to avoid the worst aspects of air pollution exposure. That is available.

Q53 Dr Offord: Okay, that is very helpful. It does concern me—I think about my own route to Parliament each day, and it perhaps has one of the higher levels of pollution. You mentioned regional government and the national Government. The Prime Minister was very much a keen cyclist before he became Prime Minister, and indeed, the Mayor of London is a very keen cyclist. The Mayor has written to us as part of our inquiry and spoken of his £1 billion he is investing in cycling, but how effective do you think those measures that he has introduced in London have been towards encouraging people to get involved in active travel?

Philip Insall: That is still a work in progress. The programme has scarcely begun. I do not think we have any meaningful numbers yet. The numbers that we have probably relate to the work carried out by the

previous Mayor, and in particular the active congestion charge, but there are quibbles about individual bits of decision making. I think that he has a very good strategic team at TfL and I would be surprised if those measures do not make a significant difference, but big as the scale of that funding is, it is still gold-plating around the edges of the major problem. For example, in Hamburg, which is a smaller city than London but a sizeable city, the mayor's ambition is for the whole central city urban area to be completely private motor traffic-free by 2025. Those are the kinds of targets that I think we ought to and could realistically be setting for some of the UK's cities.

Alan Andrews: Copenhagen is another great example. I was there about a month ago. They are aiming for 50% of all journeys within central Copenhagen to be done by bicycle, and when you are there, you see why that is a realistic target. They have bicycle lanes everywhere that have room for four cyclists to ride abreast of each other, and crucially they are separate from the road traffic, so they are much safer than the kinds of cycling lanes that we see in London, where you simply have a strip of the road that is painted blue. That is the sort of thing we should be looking at.

Q54 Dr Offord: My final question really covers what I mentioned earlier about my own route to work. Apart from active travel, are there any other obvious steps that people can take to reduce their exposure to air pollution? Walking away from traffic, I presume, but is there anything else that people can do, anything else that I can do?

Dr Mudway: Not really. I think you just have to think about your route through the city. There is a danger from an air quality perspective that we think that we can just give people avoidance strategies and avoid limit values because we give them avoidance strategies. What we are saying is that you can avoid the worst aspects of pollution on your route from A to B, but that does not move the necessity for Government to drive down the background values, because you are shaving something that is ridiculously high, depending on where you live, to something that is still far too high long-term, so you are just limiting your exposure. You still have that global requirement to keep on pushing levels down.

Philip Insall: There is something intrinsically distasteful, isn't there, about the idea that some of us, by the choices we make, can impose severe health consequences on the rest, and it is up to the rest to get out of the way?

Q55 Mrs Spelman: Just a small question, Mr Insall. I accept that it is perhaps early to quantify the benefit that the Boris bikes system has brought to London, but could I ask you whether you have quantified the benefit that the four schemes in the four London boroughs have achieved after the Olympics? Sustrans was given money to help encourage people to use more environmentally friendly methods of transport. Have you been able to evaluate any lasting benefit?

Philip Insall: I cannot answer that question from memory, but may I come back to you?¹

Mrs Spelman: Yes, do.

Chair: I would be very interested to have that.

Q56 Simon Wright: I wonder if you could explain how successful you think the Mayor of London's air quality strategy has been so far, and what impacts it has had?

Chair: Who wants to put their head above the parapet? Mr Andrews.

Alan Andrews: In answering that I would like to go back to one of the earlier comments about the success or otherwise of the London low emission zone. It is important to realise what the London low emission is and what it isn't. It is not, to my mind, an effectively designed low emission zone. In my view, much of the reason why we didn't see the benefits that we had hoped for was because there were huge classes of vehicles that didn't even come within the scope of the London low emission zone.

If you compare it to the low emission zones that have been introduced in Germany, which have been very successful in driving down emissions of NO_x, PM and especially the ultra-fine particles that we suspect are particularly damaging to human health, the German low emission zones targeted all classes of vehicles and especially focused on diesel vehicles. The other thing, of course, is that this isn't just a London problem. We do get a bit fixated on London, but air pollution is a national problem. We can't just focus on London. We need national action. We need a national system of low emission zones.

Mike Galey: I would like to support what Alan Andrews has said.

Chair: Is this in relation to Mr Wright's question about—

Mike Galey: About the Mayor's air quality.

Chair: Yes, what the Mayor of London has delivered so far.

Mike Galey: Yes, okay. The low emission zone was a brave attempt to do something extremely positive. For the reasons that Alan Andrews has already outlined, it was only partially effective, but that is not to say it wasn't worth while doing it. But there are other great areas of policy that have yet to be implemented. For example, in 2006 a group called Precis concluded its work on control of emissions from non-road mobile machinery, and in 2007 it published a report. We are still waiting for the Mayor to publish his final ruling or framework for controlling non-road mobile machinery, and we have missed some golden opportunities. On the Olympic construction site, all the construction groups on there should have had, for example, a decent particulate filter fitted. In fact practically none did have, despite all the brave promises and all the bold

¹ Note by witness: See [Cleaner air champions: pilot project report](#). Sustrans, January 2014.

words. What a missed opportunity. The fact is, the delay between deciding what sort of things need doing, coming up with a strategy and then implementation is far, far too long, and I am afraid I see that across local government as well as national Government. So much more could have been done—14% of the particulate emissions in London arise from construction equipment, and we should address that—it is a major concern. We should have addressed it years ago, but certainly we should do it without further delay. I believe key elements of the Mayor's strategy have not yet been implemented.

Alan Andrews: The ultra-low emission zone is worth a mention—they have an eye-catching and very ambitious policy, but one that doesn't go far enough. It has currently been proposed that it would only cover the current congestion charging zone, which is far too small an area to have a positive impact on air quality. It would need to be significantly bigger, because otherwise polluting vehicles would simply drive around it. The ultra-low emission zone is the kind of ambitious bold policy we need, but it needs to go further, it needs to happen earlier and it needs to be bigger.

Professor Lewis: If I can just make a point, the scale of London and its geography does impose a challenge in trying to come up with zones where we are going to restrict emissions, because almost all air pollutants are trans-boundary in the sense that you can emit them and then move them somewhere else. The larger the urban combination, effectively, the more the small island in the middle that floats in low emissions can be overwhelmed by the trans-boundary effects of things coming in from regions around it. We tend to think of trans-boundary meaning coming from France or coming from Belgium, but if you take the scale of the London area, trans-boundary effects there genuinely exist from one part of London to another. There is relatively limited room for manoeuvre in small zones.

Dr Mudway: I would just add that I am sure that in their submission you will have a roster of actions they have taken, such as retrofitting buses and investments. There are lots of committed and well-meaning people working within those organisations to enact things that would make a positive change. But it is about the magnitude of the problem and the investment relative to that magnitude. We talk about hotspots, don't we, a lot, as though you can target a hotspot? Usually they are pretty close to air quality monitors and you want them to dip below the limit value. But we should be concerned about populations who live within areas that exceed. I have done work in Tower Hamlets and Hackney recently, and we have our maps for the four years we have been there. Over that period 85% of the area in Tower Hamlets and Hackney exceeded the EU NO₂ limit. You can map that to the populations who live there, and that would be about 385,000 people. It is not really a hotspot, it is a huge area and it needs concerted action to deal with it. It is a

question that they struggle to deal with because of its magnitude and because it needs a considerable degree of investment.

That investment has to be seen against the health benefit costs, because otherwise you can never make the justification; £20 million sounds like it is quite a lot of money, doesn't it? What is the DEFRA figure? For annual mortality, it is £16 billion in health costs. You have to have those numbers in your head and then think about the magnitude of the policy you need. But I don't think we should sit here and bash the people who are in the mayoral team, because some of them are working. But they work within a straitjacket, because if you can't change traffic everything else is fiddling around the edge.

Q57 Simon Wright: But what further advice would each of you give to the London Mayor for improving the city's air quality and, particularly, in relation to nitrogen oxide emissions?

Dr Mudway: There would be a common answer here, isn't there?

Mike Galey: We do need to deal with the current transport fleet. I have already made the point, forgive me, but that means retrofitting more of the vehicles that are under his control, namely the buses—the 8,000 buses with NOx abatement technology that works. It is a relatively straightforward and proven remedy.

Chair: Anybody else?

Philip Insall: We need a progressive reduction in motor vehicle movements, don't we?

Professor Lewis: I would agree with that as my primary solution.

Chair: Sorry, I didn't hear that.

Professor Lewis: I would agree with Philip's answer—and I would reduce the total volume of vehicle movements.

Alan Andrews: It is also worth remembering that there are limits to what the Mayor can achieve by himself. I am just looking here at the Mayor's air quality strategy from a few years ago, which has a chapter on the measures that the Mayor thought the national Government had to introduce. There were 14 of them. I would be very interested in hearing how many of those have been implemented.

Chair: Okay. I am sure you will be aware we will be having the Mayor of London before our Committee and we will no doubt have an opportunity to ask him to go through those in detail. Zac, you wanted to come in.

Q58 Zac Goldsmith: I did. Dr Mudway, I just wanted to ask you a question in relation to your comments about Tower Hamlets, the Mayor's office have said that the number of people living in areas where the air quality exceeds legal limits has more than halved, do you accept that figure or not?

Dr Mudway: Let's think about how that figure is arrived at and this is about evaluation. That figure is arrived by models and model predictions that have fed into them the emission benefits that are predicted to occur through the modernisation of the Euro classes. What you really need isn't the model projections; you need the actual measurements of what happened. It is when you begin to say what happened that you realise there is a mismatch between what the emission technologies were meant to deliver and what is happening on the ground. It is a difficult question to answer. But you cannot say you have reduced 30% of the exposure based on a projection unless you can validate with measurements that that reduction was delivered, otherwise it is an imaginary number.

Q59 Zac Goldsmith: Do you have figures yourself which—

Dr Mudway: I would say that we have models, and each year our models are ratified against the measurements. Models are weak when they predict the future, but when you build your models based on events that have already occurred and you feed in the actual measurements, those models are pretty good at representing what the actual reality is. We have a map of London that has NO₂ exceedances over 14 micrograms per cubic metre as an annual average, and you can look at the area and map the population who live in the area that is exceeding it.

Q60 Zac Goldsmith: If you were to do that today, and were you to have done that five years ago, what would have been the outcome in terms of—

Dr Mudway: I would have to do that, but what I can guarantee is that there wouldn't be a 30% reduction in people who live in areas exceeding in terms of—

Zac Goldsmith: 50%.

Dr Mudway: It would not be the 30% figure—

Professor Lewis: But if the NO₂ hasn't changed over that period, you can draw your own conclusion.

Q61 Zac Goldsmith: Very well, but clearly those measurements are not that complicated. The claim is that the number of people living

in areas that exceed the limit has gone down by 50%—is that true? If that is the claim and you don't believe that claim, it surely can't be that hard to come up with the correct figures as you see them. Why wasn't it done by any of the campaign groups?

Dr Mudway: Within my department we have the expertise to do that, so if you need that information we can get that information to—

Q62 Zac Goldsmith: No, I am simply saying that there is scepticism about whether or not that was achieved, and I have no idea whether it was achieved.

Dr Mudway: Okay.

Zac Goldsmith: But if that scepticism is there, it surprises me that you or the organisations campaigning on the matter have not done the measurements in order to back up that scepticism. It is an observation.

Dr Mudway: No, no, let me explain. We have all of the measurements. We run the London Air Quality Monitoring Network. We know that there has been no change. The air quality network has measurements at specific locations, and then you have to use that measurement of those locations to adjust the model. That information exists, we can do that, and that is where the mismatch between projection and reality comes in. We can do that. We have not not done it, but it exists.

Zac Goldsmith: Okay.

Q63 Mike Kane: As a matter of interest, have you all looked up your own air quality in your own postcodes?

Dr Mudway: I would rather not.

Mike Galey: Yes.

Q64 Mike Kane: Anyone decided to move house?

Mike Galey: I live in rural Lincolnshire—I am very happy where I am, thank you.

Q65 Mike Kane: That is very good. If we produced a word cloud of this Committee so far, "London" would dominate. Being a proud Mancunian, I know that we introduced the first local ordinance for a smokers-free zone, so we have some expertise in the north, or "up north" as they would say. Yet DEFRA is now consulting on local air

quality management plans that would effectively strip away local authorities' control of their own air monitoring stations. Is that still the case, and what is your view on that?

Philip Insall: Sorry, I can't comment.

Chair: You can't comment?

Mike Gale: Really, I don't know.

Chair: Alan Andrews, I am sure you can comment.

Alan Andrews: Yes, I think I can. The proposals that DEFRA came up with I think were well intentioned.

Mike Kane: That is nice.

Alan Andrews: But the devil is in the detail with these things, and they got that detail badly wrong. The cynic in me says that that well-meaning process of trying to draw together the whole framework of monitoring and reporting and make it more coherent and more effective was a well intentioned process, but it got hijacked by the Government's attack on red tape. What we saw was that this became part of the deregulatory agenda that saw air pollution regulation as a restraint on economic growth. The best way of getting rid of that was to remove and water down duties on local authorities to monitor air quality, because when you no longer have to monitor air quality you don't realise it is a problem and you don't have to do anything about it.

Q66 Mike Kane: Public Health England are saying that 6% of the deaths in my city occur due to long-term exposure to pollution. You are saying to me that the Government, in an effort to reduce red tape, are prepared to put up with 6% of my neighbours dying early because of that. Is that—

Chair: Do you want to come back on that point, Mr Andrews? If not, I will turn to Professor Lewis to answer that point.

Alan Andrews: I don't think I have got anything further to say. That is absolutely right—

Professor Lewis: It is important that we understand that the observation base that we have in the UK is pretty thin when you move outside London. London itself is pretty thin when you think of it per head population. When you start to move outside to other major cities in the UK the number of observation stations that exist is very, very small. It is essentially the legal minimum. There has been a problem in the past in that the quality of data that is being produced by individual councils and local authorities is not necessarily of a quality you could then use for research purposes or for policy development purposes.

There is some merit in bringing all of the observations up to a standard that is uniform and useable. A poor-quality measurement is worse than no measurement at all in most cases. One thing you can attribute to the DEFRA-relayed monitoring network is that the quality of data is fit for purpose, good and it is well understood. The idea that one would bring everything up to that standard under that single-set method of control has some merit to it.

What I would want to see is a far greater density of actual observations, not looking at the observation network and seeing how can we cut back on the measurements that we made, but at how we can get that network and expand it to get some more information. There is something not right when you have cities of the order of 500,000 people and there are perhaps two or three observation stations there, and perhaps only one of those meets the appropriate quality standards for the data to be used.

Q67 Mark Lazarowicz: Can I come back to this issue of low emission zones and, again, like my colleague, move away from London? How many low emission zones are there in the UK at the moment?

Alan Andrews: It depends on what you class as a low emission zone.

Mark Lazarowicz: You tell me.

Alan Andrews: I would say there is only one, which is London. There are two or three others—Mike might be able to correct me if I am wrong—Oxford, Norwich, and I think there is one now in Brighton, but those are very, very limited low emission zones.

Mark Lazarowicz: I was just checking on the EU website and I could only see London, and to my own knowledge there is something in Oxford. I wondered if it was old information on the web, so clearly it wasn't. It is only London and three very small ones elsewhere.

Alan Andrews: Exactly. In comparison Germany has over 70.

Mark Lazarowicz: A subsequent point Mr Galey was going to go into was to have very quick look through what exists elsewhere. There are some in Germany, Denmark, Italy, Netherlands, Sweden and quite a few others, so it is not like it is not meaningful.

Alan Andrews: There are about 400 across Europe.

Q68 Mark Lazarowicz: Yes. What is the reason, then, why you think we don't have that coverage of low emission zones in the UK? Is it simply the political leadership both nationally and locally, or is it more complex than that?

Alan Andrews: Very generally, yes, it is a lack of political will and a lack of leadership. Specifically, the current approach is completely back to front. DEFRA are essentially taking a bottom-up localism agenda-type approach here. They are saying to local authorities, "If you want to implement a low emission zone, by all means go ahead and we will give you £50,000 or so on to do the initial study to see if it is feasible". That is completely back to front. What we need is central Government taking a lead and giving local authorities the tools that they need to implement low emission zones and saying to them, "If you are not going to implement a low emission zone, what are you going to do? What measures are you going to take that will be equally effective in delivering compliance with EU values and offsetting some of the health impacts that we have heard about?"

What we need is a national framework of low emission zones that sets the relevant standard, establishes a certification scheme for the retrofit equipment and ensures that we have a coherent network of low emission zones. What we have at the moment, even if we do have a few local authorities coming up with their own low emission zones, means that we will run the risk of having a vehicle operator in Leeds having a vehicle that he can drive in Leeds but not in the low emission zone in Sheffield or Manchester, which makes absolutely no sense at all.

Mark Lazarowicz: A fleet of lorries or buses will just be used in one area and not another? That could happen?

Alan Andrews: You also run the risk that one area will set up a low emission zone and the fleet operator will just simply move his more pollutant vehicles from that city and shift them somewhere else. You are just moving the problem around the country.

Q69 Mark Lazarowicz: Looking at the examples elsewhere in Europe, you had criticisms even with the London one, let alone some of the smaller ones here in the UK. BY and large, can we regard the European network as having a very positive effect on emissions, or do some of these get criticisms in the same way the London ones do? How well are they working in the EU?

Alan Andrews: We need to be very careful who we choose to copy from. We should copy from the Germans and not from the Dutch. How you design a low emission zone is absolutely critical. Some are very small low emission zones covering a very small geographical area, or only covering one or two classes of vehicles, such as HGVs. There are similar sorts of criticisms that I would apply to London—apart from the geographical area, of course, because London is the biggest low emission zone in terms of geographical scope.

Q70 Mark Lazarowicz: Going back to London, we had a discussion not long ago about buses, but taxis are also exempt from the application of the zone in London if they are less than 15 years old. How significant are these vehicles at contributing to air pollution within London LEZ?

Mike Galey: Taxis do need addressing. There have been various schemes mooted over the years for cleaning up the existing fleet. But now, with the challenges that we face in London, we have to somehow deal with NOx as well as particulate. To go back to the general issues, if I may, on low emission zones in the UK, the one in Oxford is primarily targeted at buses because that was where the problem was seen. From 1 January 2014 all the buses have to meet the Euro 4 standard.² The one in Brighton is going to be Euro 5 from 2015 but, again, targeted primarily at buses. There is a very good reason for targeting buses first, as I have tried to explain to the Committee.

But looking further afield, when you introduce a low emission zone in a city the vehicle operator has three choices: he reorganises his fleet, he renews his fleet—buys new vehicles, which is expensive—or he retrofits. It is the three “res”: renew, reorganise, retrofit. The problem at the moment is that without any national network of low emissions zones, the reorganise option is all too easy. What we need is a national framework that establishes a standard for low emission zones that can be applied. Leave it to local authorities to decide where they are going to apply them, because they know where the problems are. A national framework that sets the standards that can be applied, with a national certification scheme for retrofit technologies, because they will continue to be a key part of compliance with low emission zone requirements. They we can leave it to local authorities to implement those, but leave the operators less room for reorganising their fleets to avoid the problem.

Q71 Mark Lazarowicz: Of course, in the UK it is very much left to local government to decide to originate the proposal. It is not something that the Government will impose upon local authorities.

Mike Galey: No, it is very much hands-off. There are lots of groupings in local authorities already—the low emission strategies group, for example, whereby local authorities get together, and the meetings are attended by DEFRA and DfT too. They get together to discuss the problems but they each come up with their own strategies and their own ideas. We have the ECO Stars Fleet Recognition Scheme, whereby an operator who operates a cleaner fleet gets some stickers to put on his

² Note by witness: From 1 January 2014 all buses have to meet Euro V standard in Oxford. However, some Euro IV buses already in service were allowed to continue to operate for a further 2 years (until 31 December 2015) under an ‘exception’ arrangement.

vehicle. But, bluntly, we need more severe measures than that—some would say draconian—to address the problem.

Q72 Chair: Can I just go back to my first question about what has happened since 2011? Given that that was one of the recommendations of our reports then—

Mike Galey: Very little. A lot of chat and not much action.

Q73 Mark Lazarowicz: My final question is simply because I am an MP from a constituency in Edinburgh and we have problems of this nature as well. We were not one of those named in the European Commission's list, but there are serious problems.

Can we just be clear, in terms of governmental responsibility outside England, is it the devolved Administrations who take responsibility for low emission zones or is it still DEFRA, at least in GB? I always have difficulty working that out. I wonder if you know—if not, maybe we will leave it for another day. Is it DEFRA or the devolved Administrations?

Mike Galey: Not sure.

Chair: Caroline, is that DEFRA?

Mrs Spelman: They are the ones being infracted. That answers the question, doesn't it?

Mike Galey: Can I just say, having heard about your interest in Edinburgh, that Edinburgh has done a fine thing? Again, they addressed the issue of their older buses, including the tourist buses, and they lined up some of the newer buses against some of the retrofitted buses. The strapline on the back of the older buses, which had been cleaned up, was "Old but not reeky", which I thought was particularly appropriate in the circumstances.

Mark Lazarowicz: That was because it was a Ministry-owned bus link, so basically we didn't do it because, effectively, it can be—

Mike Galey: They have the money.

Mark Lazarowicz: We have done it that way, which doesn't—

Mike Galey: The Edinburgh council made it a priority to deal with those vehicles, and because they have control of those vehicles they did it. Surely other local authorities, when they are putting out routes for tender to the bus companies, can insist that they meet certain environmental standards, but precious few of them do that. That is action that could be taken tomorrow.

Chair: Congratulations go to Edinburgh council for having done that.

Q74 Mrs Spelman: I want to come back to something Mr Galey said, because I want to drill into it a little bit. Rather depressingly, you said that Euro 3 was probably more effective or easier to implement than 5 or 6, if I understood you correctly.

Mike Galey: The standard was less demanding for Euro 3, of course.

Mrs Spelman: I see.

Mike Galey: Because Euro 4 meant lower particulate and lower NO_x, and Euro 5 likewise. Each standard has been more demanding but it was the introduction of technologies outside the engine itself that was required to meet the Euro 5 standard, and those technologies are not proving to be particularly effective in real-world operation.

Q75 Mrs Spelman: Euro 6 is probably not fit for purpose then?

Mike Galey: Euro 6 is more demanding again. The drive cycles that are used for testing Euro 6 vehicles are, for example, the world harmonised transient cycle and the world harmonised state cycle. They are much more demanding and much more representative of real-world operation and cooler cycles. But in order for Euro 6 vehicles to achieve those very tight, very demanding Euro 6 standards, it requires a lot of technology. A Euro 6 exhaust system is a big beast weighing more than 100 kilograms, because it contains catalyst, filters, air injection and all sorts of things to be built in to allow the engine manufacturer to meet the Euro 6 standard. It has become a much more complex thing altogether, and I am quite hopeful that Euro 6 will deliver the expected benefits.

Q76 Mrs Spelman: Okay, that is helpful, but for air quality we depend heavily on the existing fleet, and you have touched on the retrofitting question.

Mike Galey: Yes.

Mrs Spelman: Could you answer something for me?

Mike Galey: I will try.

Mrs Spelman: There was a lot of coverage of the fact that the retrofitting kits, which I believe can be as little as £3,000 per HGV, don't work when traffic is stationary, is that true?

Mike Galey: The answer to that is no.

Mrs Spelman: It is not true.

Mike Galey: No. Essentially, if you are retrofitting a diesel particulate filter, the cost is typically just £3,000 to £5,000. The majority of the systems that are supplied in the marketplace use catalyst technology that requires a temperature of around 250 degrees to operate efficiently; 250 degrees is typically found in heavy-duty vehicles. Achieving that sort of temperature in a bus operating in London is no problem at all.

The most popular and common retrofit technology basically uses a catalyst and a filter within the system, and it does operate very effectively on the 7,500 London buses. The problem with the earlier generations of that technology was they tended to increase NO₂. That has now been remedied, but looking forward, since NO₂ is a problem, we need to consider the combined technologies—such as those we talked about earlier—with a particulate filter and selected catalyst reduction for getting rid of the knocks and the tailpipe NO₂.

Q77 Mrs Spelman: How much would it add to the cost of the vehicle?

Mike Galey: That is the £10,000 figure that we mentioned earlier for combined technology, and that does the lot.

Q78 Mrs Spelman: We keep talking about buses.

Mike Galey: Yes, sorry.

Mrs Spelman: I understand the preoccupation with buses, but in the low emission zones HGVs are, by number, the greater offender, if you like. How effective is the retrofitting kit for HGVs and what, on average, is the cost of an effective one?

Mike Galey: Okay. The cost for an HGV is about the same as it costs for a bus. The technology is the same—

Mrs Spelman: The top of the range for £10,000.

Mike Galey: For a combined system that reduces particulates and NO_x, it would be about £10,000. For a diesel particulate filter, again, the range is £3,000 to £5,000, depending on the size of the vehicle. But we have to remember that lorries are not on the road for so long, and the majority of lorries are operated by larger fleets who have more opportunity to switch them around. So, in meeting the requirements of the London low emission zone, the large fleet operators switch their vehicles around rather than retrofit them, by and large. In doing so, because the standard was Euro 4, they introduced Euro 4 and Euro 5 vehicles, which they had aplenty in their fleet, into London operations and, as we have discussed a few times this afternoon, those have not been as effective as was hoped in driving down emissions. We have

actually probably not done a lot of good by making that “reorganise” option quite so simple for HGV fleets.

Q79 Mrs Spelman: Have you measured that? With a low emission zone that is out towards the M25/M4 interchange at Heathrow, which means that HGVs that are non-compliant cannot enter it, have you seen new hotspots emerge as a consequence of reorganisation?

Mike Galey: I haven’t. I don’t know if others might have.

Chair: I think this is an important point, because we are not just talking about London. We are talking about air quality for the whole of the country.

Mrs Spelman: Yes, elsewhere. Displacement.

Chair: We are concerned about the implications of one policy in one place on other parts of the country.

Mike Galey: Yes.

Professor Lewis: There are two bits of evidence that essentially we lack. One is that when you retrofits or do any perturbation to the fleet, you actually get the benefits. One of the difficulties there—and it is a rather leaky scientific difference—is that you start to need to measure in different units from air quality measurements. Air quality measures the concentration, but actually what you need to know is how many kilograms per second are coming out of your vehicles.

Chair: Which comes back to monitoring.

Professor Lewis: It is a different unit, that is the problem. We are not well set up, if you like, to turn our attention to measuring in those units.

Q80 Mark Lazarowicz: We have gone through that problem. What we need to know—and maybe you can’t help us—is why we have a situation where dirty vehicles in London have basically been moved to operate in Birmingham, Manchester and elsewhere. Is that is what is happening? Is there any evidence that it is happening?

Mike Galey: Absolutely. The national bus companies—I shouldn’t talk about National Bus Company, but the bus companies who operate nationally—do switch vehicles about. I am sure there must be some ex-London buses operating in Manchester.

Chair: We need to get on, and I am conscious that we have two more quick questions.

Q81 Mrs Spelman: Just one more very quick question from me. I got the point about the non-tailpipe emissions—bits of brake and broken things. What can we do to reduce non-tailpipe emissions?

Dr Mudway: Well, we could invest in new technologies. That hasn't been really investigated. Or we could have fewer vehicle journeys and lighter, less powerful, vehicles.

Q81 Dr Offord: I wanted to ask you briefly about the proposals for the EU package that were published last December. What is your opinion of them?

Alan Andrews: Hopelessly inadequate.

Dr Offord: You shouldn't sit on the fence.

Chair: This is a serious matter.

Alan Andrews: For a variety of reasons, the proposals that the Commissioners came forward with just won't solve the problem. I will focus on the National Emission Ceilings Directive for now, because that is the main thrust of the proposal. It is the main overarching piece of legislation governing emissions of output, so it is about pollution from source from all sectors from all member states.

The current proposal sets a target for 2020, a non-binding indicative target for 2025 and then a further binding target for 2030. The target for 2020 is lower than the current EU-based one. So member states would be able to emit more than they are currently allowed to under currently agreed EU legislation. So it is utterly meaningless and will do nothing to drive down emissions of air pollution and thereby improve air quality in the next five to 10 years. The 2025 target is non-binding; it is indicative. Member states can flout that at will. It will have very little effect. So we are looking at the 2030 target; that is far too late. The ambition level within that target is far too low. Even if all member states achieved that target, we would still have 260,000 premature deaths each year in the EU. 20,000 of those would be in the UK, so it really only addresses half the problem, if that.

We need to be looking at a radically greater level of ambition than what has been proposed. The danger is that typically, Commission proposals only go one way, through the co-decision procedure. It is likely that this will actually get even weaker once member states have their say.

Q82 Dr Offord: Mr Insall, where do you see the responsibility of the European Union and where do you see the responsibility of the British Government with regard to air quality?

Philip Insall: Of course I am interested in the potential for switching local trips to non-motorised transport. Subsidiarity does make

the role of the European Union difficult in that. It has some fairly willy-waffly bits of policy that are really communications-driven rather than hard policy.

There is one area that can be of interest, which is the Trans-European Transport Network. We have been working with others to try to encourage the Commission to think of the TEN-T, as it is called, in terms of the full corridors of transport networks and the potential for bringing about travel behaviour change, particularly to cycling, in those corridors. In terms of the questions you are asking, this is quite a difficult area for the Commission, whereas it has more remit when it comes to things like urban air quality. It may not be able to take or drive very convincing action in terms of local transport, but it might be able to influence it at one remove were it to take more stringent action on air quality.

I hope that makes sense—it kind of made sense in my head.

Alan Andrews: Just to be fair to the Commission, the proposal it came out with was the most ambitious that it thought it could get away with in the face of intensive lobbying from member states and industry. The UK's role in all of this was pretty key as well. Let us not forget, the aim of the Commission's review of EU air policy was to look at ambient air quality standards, look at the health evidence and see whether there was a case for tightening the current limit values. The overwhelming evidence was that they should, and that the current standards were woefully inadequate to protect human health, but because member states, led by the UK, were lobbying for further flexibilities and further time extensions for achieving the current standards, we do not have a revised ambient air quality directive. We are stuck with ambient air quality standards that we know are inadequate to protect human health for the foreseeable future.

Q83 Dr Offord: Very quickly, Mr Andrews, what was your rationale for taking the UK Government to court over air quality?

Alan Andrews: I will go back to my first comment, which was lack of political will. We just did not see that the Government cared enough about this problem to make it a priority to take the steps that were required. By that time we had already seen one EAC inquiry's recommendations ignored and were midway through a second one when we filed the case. We didn't just do it on a whim, it was the end point in a long series of correspondence with DEFRA where we were asking them to come forward with more ambitious plans and saying, "Look, compliance by 2025 with a standard that has been in place since 2010 just isn't good enough, especially when you are not proposing any really ambitious new measures". The one new measure we saw in their plans was this idea of a national framework for low emission zones. We have still not seen any progress on that three years later.

Dr Offord: But a concern I would certainly have is that that puts the UK at risk of being fined when other EU countries simply pollute and get away with it.

Alan Andrews: Well, no, because the Commission does have 17 open cases against member states in relation to breaches of PM10 limits, and those cases are further advanced than the NO2 case against the UK. Those cases will probably be dealt with first. The UK is the first to face action on NO2 but that is its own fault. It could have applied for time extensions for all zones as most, if not all, other member states did, and it chose not to.

Dr Offord: Thank you.

Q84 Zac Goldsmith: I just want to know who led the charge from the UK Government in lobbying to keep the targets low in Europe? Where did that come from, which Department of Government?

Alan Andrews: I couldn't say. I am not privy to those conversations.

Zac Goldsmith: Would it have been—

Alan Andrews: I could hazard a guess that it was not DEFRA.

Zac Goldsmith: Treasury boys?

Alan Andrews: I would think so. Or Cabinet Office.

Q85 Peter Aldous: One short question, and an answer from everyone in one sentence if possible. How successful do you think Government is being in pursuing a joined-up approach across Departments? Perhaps there are too many eggs in the DEFRA basket? Mr Andrews?

Chair: One sentence each.

Alan Andrews: Not very, and I base that on the numbers of meetings that have taken place between DEFRA officials and their colleagues from DfT, DECC and the other Departments.

Professor Lewis: I would agree. DEFRA don't have the resources to co-ordinate a joined-up response across Government. They just don't have the people to do it.

Philip Insall: I would say on physical activity, we now have a pretty good cross-governmental party involving Ministers from I can't remember how many different Departments working together reasonably well, and I dare hope that is going to be effective. I don't see why it could not be done on this issue.

Dr Mudway: It is not successful at a national level; it is not successful at a local level. We worry about traffic; we build affordable housing next

to roads; we have put three schools right next to roads that we have identified as being heavily polluted. How joined-up is that?

Mike Galey: DEFRA have the will but not the resource, DfT have the resource but slightly less will and Health need to influence both of them rather more strongly.

Q86 Neil Carmichael: A quick question: if you were heading across to Brussels to reform Britain's relationship with the European Union and air quality was your remit, what would you be asking for?

Chair: We will start with you this time, Mr Galey.

Mike Galey: That is a really tough question.

Chair: While you think about it I will move on.

Mike Galey: Yes, can I come back to that? Thank you. Sorry.

Dr Mudway: It is not any easier for me. I would say to show accountability, to take on board expert advice and to do something about the limit values, which we know are too high. Accountability.

Philip Insall: I have nothing to add, I am afraid.

Neil Carmichael: Alastair? You are full of ideas.

Professor Lewis: Well, I would certainly demand that policy around air quality is also tighter policy around carbon. That is not yet connected in any meaningful way in Europe.

Alan Andrews: As someone who moved to Brussels last year to work on air quality, I don't think I can dodge that question.

Neil Carmichael: No, I don't think so.

Alan Andrews: Two points. First, to make sure that policy is led by science and not politics so the Commission should be coming up with proposals based on the science, not on what they think is politically achievable. Leave that for the elected representatives in Parliament and council. My second point is connect this to the voters. We have seen alienation and a disenchantment with EU politics, and this is one issue that can really connect with voters. Show them why we need EU legislation to tackle air pollution.

Mike Galey: We have to make sure Euro 6 works, of course we do, and that is a European issue, but the problems faced by London are faced by every other major city in Europe. I think it is about encouraging the EU to look at air qualities as a European problem, not just taking the UK to task over these things. We need to make sure that every country in Europe does whatever it can to address the problem and make its own contribution. It is a Europe-wide problem.

Q87 Chair: Finally, you haven't really mentioned investment, where the investment should come in and whether it should be for retrofitting or other investment areas? Does the Green Investment Bank have a role in this through the money that they have for loans for investment?

Professor Lewis: Can I make a comment about the precursor to investment? I think we should treat this whole area a little bit in the same way as we treat the development of medicines that go through a whole stage of clinical trials of ever increasing size. At each of those stages you have to prove the efficacy of what you have done before you can release them. There is rather too much jumping to the answer without having gone through those stages of trials. If one was going to make investments from any source, you would want to see that staged evidence build up over time before you started to put really large money in.

Chair: All right. On that note, we will finish. Can I thank each of you for coming along and giving evidence this afternoon? I hope you will follow very much the progress of our current follow-up inquiry. Thank you.