OFFICIAL REPORT
AITHISG OIFIGEIL

Environment, Climate Change and Land Reform Committee

Tuesday 2 May 2017

Session 5

The Scottish Parliament
Pàrlamaid na h-Alba

Tuesday 2 May 2017

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ENVIRONMENT, CLIMATE CHANGE AND LAND REFORM COMMITTEE
13th Meeting 2017, Session 5

CONVENER

*Graeme Dey (Angus South) (SNP)

DEPUTY CONVENER

Maurice Golden (West Scotland) (Con)

COMMITTEE MEMBERS

*Claudia Beamish (South Scotland) (Lab)
*Alexander Burnett (Aberdeenshire West) (Con)
*Finlay Carson (Galloway and West Dumfries) (Con)
*Kate Forbes (Skye, Lochaber and Badenoch) (SNP)
*Emma Harper (South Scotland) (SNP)
*Richard Lyle (Uddingston and Bellshill) (SNP)
*Angus MacDonald (Falkirk East) (SNP)
*Mark Ruskell (Mid Scotland and Fife) (Green)
*David Stewart (Highlands and Islands) (Lab)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Peter Chapman (North East Scotland) (Con) (Committee Substitute)
George Curley (NHS Lothian)
Will Garrett (City of Edinburgh Council)
Emilia Hanna (Friends of the Earth Scotland)
Anna Heslop (ClientEarth)
Fintan Hurley (Institute of Occupational Medicine)
Vincent McInally (Glasgow City Council)
Craig McLaren (Royal Town Planning Institute)
Janice Milne (Scottish Environment Protection Agency)
Professor David Newby (University of Edinburgh)
Dr Colin Ramsay (Health Protection Scotland)
Professor Bob Rees (Scotland's Rural College)
Professor Tom Rye (Napier University)

CLERK TO THE COMMITTEE

Lynn Tullis

LOCATION

The Robert Burns Room (CR1)

Scottish Parliament

Environment, Climate Change and Land Reform Committee

Tuesday 2 May 2017

[The Convener opened the meeting at 09:46]

Interests

The Convener (Graeme Dey): Good morning and welcome to the 13th meeting of the Environment, Climate Change and Land Reform Committee in 2017. We have received apologies from Maurice Golden.

I remind everyone to switch off mobile phones and any other electronic devices, as they may affect the broadcasting system.

I welcome Peter Chapman to the committee as the formal substitute for Maurice Golden, our deputy convener, and invite him to declare any interests that are relevant to the committee's work.

Peter Chapman (North East Scotland) (Con): Thank you, convener. I am a landowner and farmer in Aberdeenshire. In respect of today's agenda, I declare that we own four wind turbines on the farm. That covers everything.

Decision on Taking Business in Private

09:47

The Convener: Under our next agenda item, we have a decision on taking items 3 and 4 in private. Are members agreed?

Members *indicated agreement.*

Air Quality

09:48

The Convener: Under our next agenda item, members will take evidence on air quality in Scotland. The committee agreed to hold an evidence session with experts and stakeholders to consider the scale of the issue and the robustness of Scottish plans to tackle it.

The evidence session will be structured in two panels: the first focuses on the environmental and health impacts of air pollution; and the second focuses on the effectiveness of the policies and management strategies to tackle those impacts. Based on the discussions, the committee will consider whether it wishes to pursue the issue further and, if so, which particular threads of the topic will be prioritised in the remit of any future inquiry.

We will take evidence from our two panels of witnesses in a round-table format to allow a fuller discussion of the issues. Members will pose questions to prompt exploratory discussion; if any witnesses wish to contribute, please indicate that to me or the clerks. Importantly, you do not have to respond to every question if you do not wish to.

Each session will last roughly an hour, so I ask that both questions and answers are kept succinct to allow us to cover as much ground as possible.

On our first panel, we are joined by Professor David Newby, Fintan Hurley, George Curley, Dr Colin Ramsay and Janice Milne. We will move directly to questions.

What are the main sources of air pollution in Scotland and how robust is the modelling and evidence to confirm that?

Janice Milne (Scottish Environment Protection Agency): The main sources of air pollution are from industry, for example power plants and other industrial sources, which contribute a number of combustion gases, such as NOx, or nitrogen oxides, and SO_2, or sulfur dioxide. Increasingly, transport is a contributor of NOx and particulate matter to air pollution.

With respect to modelling, the industrial activities that the Scottish Environment Protection Agency regulates tend to be at the more complex sites. We require operators to monitor what is emitted from their stack, SEPA does some audit monitoring of that and we ask operators to do some modelling, which backs up the emissions from the stack.

We are working on modelling the transport side of things under the cleaner air for Scotland strategy. We know that there can be differences, numbering in the high percentages, between computer models. That is one of the reasons why we are trying—under that strategy—to come up with one model that all local authorities can use, as it would reduce the uncertainty. However, there are uncertainties with any computer model and it is always advisable to back it up with monitoring. It is not possible to provide a percentage for how accurate the models are.

The Convener: If one accepts that that is a very good answer to my first question, I ask the other witnesses to consider how readily those main sources of air pollution can be controlled and whether there are any new sources that are becoming a concern. For example, in the written evidence, I read a suggestion that CO_2 emissions from wood-burning stoves and commercial biomass boilers are causing concerns. Can we explore that angle?

Dr Colin Ramsay (Health Protection Scotland): That was in my submission. The marked growth in the use of wood-burning stoves is a relatively recent phenomenon. It was particularly noted in London, where the distribution of particulate pollution was looked at, and we are beginning to get concerned about the contribution of that to air pollution. Although we have smoke-control zones under historical legislation—the Clean Air Act 1993—people have to be aware of that feature.

The picture is changing and evolving over time and efforts to use more sustainable sources of energy sometimes have unforeseen consequences that people cannot predict. There has been concern about the emphasis on switching from gas boilers to biomass boilers in schools, which some people regard as being controversial. Whether it is advantageous from an emissions perspective is a little bit questionable.

There are some trends. I would not want to exaggerate their contribution in relation to all the other contributions from transport and so on, but we have to be aware that the dynamic is changing and have regard to how that affects the overall balance of sources of pollutants.

The Convener: Is that something that we think we ought to be concerned about or that we know we ought to be concerned about?

Dr Ramsay: We know that we ought to be concerned about anything that contributes more to air pollution.

The Convener: Is there evidence that suggests that it is an issue that we should be concerned about? That is what I am getting at.

Dr Ramsay: The latest work in London has looked at the contribution of wood-burning stoves and so on to particulate pollution.

The Convener: How are we placed to control the main sources that we are absolutely sure of?

Janice Milne: For the activities that are specified in regulations, SEPA has responsibility for authorising permits and operators must apply for them. As part of that, they must demonstrate that they use what we call best available techniques to reduce or minimise emissions. We have a role in protecting and improving not only the environment, but health and wellbeing and sustainable economic growth.

It is less easy to control non-regulated sources of air pollution, such as diffuse pollution, whether that comes from transport or from domestic premises.

Kate Forbes (Skye, Lochaber and Badenoch) (SNP): The written evidence from the Scottish Environment Protection Agency stated that all pollutants, with the exception of ammonia, had shown dramatic reductions over time. Why has ammonia not reduced at the same rate as other relevant pollutants, and what action might be taken to address that?

Janice Milne: The main sources of ammonia emissions are agricultural activities, so they are less easy to control because they are what we call diffuse pollution. We regulate and can set certain conditions on intensive agricultural installations, including intensive pig and poultry rearing, but it is more difficult to set controls for other sources, such as spreading manure. That is why we have not seen emissions of ammonia reduce in respect of other industrial activities that are less easy to control with certain abatement techniques. The matter requires an increased focus, and a policy emphasis needs to be placed on the issue.

Fintan Hurley (Institute of Occupational Medicine): This may be a guess, but the primary pollutants that we get focused on are particulates, nitrogen dioxide, ozone and so on. Ammonia has an effect by combining with those gasses to make other particles, so it is not directly in the line of sight as much as other pollutants are, because its role is secondary and indirect although still important.

Kate Forbes: A lot of the other written evidence made the point that levels of air quality are constantly changing. What difficulties does that pose for monitoring and mitigation? How can we ensure that we are constantly improving the quality of air?

Janice Milne: We have 95 monitoring networks around Scotland, which regularly produce information on an automatic basis that is then made available on the web. Obviously, weather conditions have an impact. On clear, still days, pollution does not move so far; on cold days, there is what we call an inversion layer, where pollution gets trapped, so levels will be higher than on a windy day. That is why you will see variations in what is picked up at the monitoring stations. The weather plays a big role.

Finlay Carson (Galloway and West Dumfries) (Con): Have we baselined those pollutants? We have talked about agriculture playing a major role, but do we know whether the amount of ammonia produced through agriculture has increased or decreased? With anaerobic digesters and different methods of cropping, are we looking at an increase or a decrease in the pollutants from agriculture?

Janice Milne: I do not have that information to hand, but I can provide it later. We need to be aware of transboundary impacts. Air pollution does not sit neatly within one boundary, so we must always take into account the fact that we are seeing pollution effects from other European countries. Therefore, it is quite difficult to get a baseline for background levels. That is why we have the monitoring sites in places such as Strath Vaich, in the Highlands; it allows us to understand what the background level might be in a rural area and to compare that with what is happening in other areas.

Richard Lyle (Uddingston and Bellshill) (SNP): I take on board the comments about agriculture. Do the panel members have any concerns about the waste-to-heat plants that are currently at the planning stage?

Janice Milne: Each planning application will be dealt with on its own merits. SEPA is a statutory consultee, together with other organisations, and I am not aware of anything.

Kate Forbes: I have one last question about the general picture. What are the current key targets for air quality, and are they adequate?

10:00

Janice Milne: The targets are set within the air quality strategy for the United Kingdom as objectives to protect human health. That is what we are aiming for and we consider that the targets are adequate.

Fintan Hurley: The strong understanding on particulate air pollution is that there is no safe level—no matter how good the target is, there are likely to be health effects. It is important to remember that particularly for particulate pollution, but I think that it is also the best working assumption for ozone, although that might not be the case.

Scotland has adopted more ambitious targets for particulates than the UK has or the European Union would require, which I am glad of. However, even if the targets are met, that does not mean

that the problem is entirely solved, because the biggest problem with air pollution is that we cannot avoid exposure: everybody is exposed. Therefore, even if targets are met, there will still be health impacts and, I think, there will still be a substantial public health issue.

The Convener: You have said that the science sometimes lets us down. For example, a few years ago we were all encouraged to buy diesel vehicles because we were told that they would be better for the environment, but the World Health Organization subsequently revealed that the testing of the filters on modern diesels was not properly conducted and that, in fact, diesels are spitting out into the atmosphere worse particulates, including cancer-causing particulates, than we had ever believed was the situation in an urban setting.

Fintan Hurley: There are two aspects to that, the first of which is the huge importance of not developing a policy in isolation. The Scottish policy is set up so as not to develop air quality policy in isolation but to look at climate change effects, placemaking effects and so on—I am really glad of that. The push towards diesels in the first instance was because of climate change issues, but that was before people realised that the local air pollution problems that diesels cause were going to be so big. The failure to do the emissions testing correctly is not necessarily just a failure of science; I think that we all know that there is maybe more to it than that.

The Convener: Okay, let us move on.

Angus MacDonald (Falkirk East) (SNP): I want to explore in some detail the air quality management areas. We know from SEPA's submission that, despite improvement in recent decades, there

"are still some urban hotspot areas where air quality is of concern."

We know that there are currently 38 AQMAs in Scotland, with all but two declared for transport emissions. I know from representing my Falkirk East constituency that one of those two AQMAs takes in the Grangemouth petrochemical complex and the surrounding area; it was declared following sulfur dioxide breaches and has been in place for some time—perhaps too long.

AQMAs seem to help to concentrate the minds of some firms. For example, Ineos in Grangemouth has invested significantly—to the amount of £30 million—in a sulfur recovery tail gas unit, which has resulted in significant reductions in sulfur dioxide breaches. So, that accounts for one of the non-transport AQMAs. Can SEPA tell the committee where the other one is and where the worst of the urban hotspots are in the other 36 AQMAs?

Janice Milne: I think that I am correct in saying that the second AQMA that you referred to is Newhouse in West Lothian. The reason for that AQMA exceeding limits is domestic use, or non-transport emissions.

Angus MacDonald: Sorry, but can you clarify "domestic use"?

Janice Milne: Sorry. It refers to stoves.

Angus MacDonald: There must be an awful lot of stoves in West Lothian.

Janice Milne: That is the data that has been gathered. I can provide that information to the committee later on, but the non-transport emissions relate to domestic use.

The Convener: Perhaps you could write to us with that information, because it would be useful to have the detail.

Janice Milne: Okay.

Angus MacDonald: Can you give us an indication of the situation in the worst of the other urban hotspots in the other 36 AQMAs?

Janice Milne: I do not have a list of the worst hotspots. Although I know that we can identify the major areas, I would not want to say today what is the worst hotspot. We know about areas such as Hope Street in Glasgow and areas in Edinburgh, but I do not have further details now. I will submit further information afterwards.

Mark Ruskell (Mid Scotland and Fife) (Green): I return to AQMAs that are designated because of transport emissions. What actions is SEPA involved in in highly polluted areas?

Janice Milne: Local authorities have the responsibility to review and assess the air quality in their areas against the objectives that are set in the air quality strategy. Where the levels do not meet the objectives, local authorities have to submit an action plan, which details the actions that they will take to meet the objectives. We review and assess the plans. As I say, the local authority has to put together an action plan and one of the challenges is how we improve the situation. As we have discussed, the majority of AQMAs are down to transport emissions, so it is for the local authority to put plans in place. One of the challenges is knowing what action to take to give us the required reduction in emissions.

Mark Ruskell: If you judge that the actions in a plan will not be effective in reducing nitrous oxides and particulates, do you step in and tell the local authority that it needs to change the plan?

Janice Milne: Yes, we would do that if we thought that the plan was not adequate. One reason why we have the cleaner air for Scotland strategy is probably that we know that the issue is

so difficult to address. Although we have the powers to step in and say that a plan is not effective, we would not do that in isolation and without knowing all the facts. As I say, there is now the cleaner air for Scotland strategy, which includes a commitment to have at least one low-emission zone by 2018, but it is a very difficult problem to address, which requires a—

Mark Ruskell: How often has SEPA stepped in?

Janice Milne: I do not have information with me on how often we have stepped in to say that a plan is inadequate, but I can come back to you on that.

Mark Ruskell: It does not stick out that you have intervened in any of the plans.

Janice Milne: I think that we probably have. I am sorry, but I do not have the information to hand. We have at least two people who deal specifically with local air quality and local air quality management plans. When the plans have been inadequate, we have gone back and said that they are not adequate, but I do not have the figures in front of me.

We are tightening up on getting local authorities to submit their action plans on time, as they were not always being submitted to us timeously. We are able to use the powers under section 85 of the Environment Act 1995, but we have not had to use those powers because the performance of local authorities in submitting their plans has been far better. The challenge is ensuring the effectiveness of the plans and seeing the results through.

Mark Ruskell: It would be useful, convener, to get a couple of case studies of instances when SEPA has and has not intervened and the reasons for that.

The Convener: Absolutely. It would be useful if that information can be provided in due course.

Mark Ruskell: We want evidence that shows whether the regulatory system is working.

Angus MacDonald: My question follows on from Mark Ruskell's point. Does Janice Milne believe that liaison between local authorities and SEPA on air quality is working?

Janice Milne: Yes. We have good links. We have worked with local authorities over many years, as the local air quality management system has been in place since 1996. We work well with local authorities. SEPA is represented on the Scottish pollution control co-ordinating committee, which is a forum at local authority level, and on other groups with local authorities.

Angus MacDonald: Do local authorities have adequate powers to deal with air pollution and AQMAs?

Janice Milne: The challenge is to implement the action plans, which requires changes in public behaviour. It is not a simple thing to enact, otherwise local authorities would probably have made the improvements many years ago.

It requires a concerted effort, which is why the CAFS—cleaner air for Scotland—strategy was developed, which brings together climate change, transport and communications legislation. We have discussed actions that are being taken because of climate change that have impacted on air quality. One of the aims is to ensure that decisions that we make for climate change purposes also have multiple benefits for air quality improvement.

Angus MacDonald: Just for the record and for information, can you tell us what area of land an AQMA covers? Is an AQMA designation sufficient to tackle air pollution?

Janice Milne: The air quality management areas vary in size. They can be one street or they can be wider than that. It depends on what the monitors are showing and the evidence. The areas vary in size, but they are generally based around the roads.

Angus MacDonald: As an example, is the non-transport-emission AQMA that you mentioned in West Lothian just one street?

Janice Milne: I will get back to the committee with that information.

Richard Lyle: Colin Ramsay's submission states that

"Scotland ... has some of the strictest health based air quality targets of any comparable country and does relatively well in meeting these",

but that there is

"still room for further reduction in transport related air pollution, especially in heavily trafficked urban areas".

How should we reduce that air pollution? What actions should we take?

Dr Ramsay: That is what the cleaner air for Scotland strategy is all about. It sets out measures to tackle transport-related air pollution, which is one of the most potentially preventable sources of air pollution that we have, because it is generated by our activities. I say "our", because I think that we all contribute to it in one way or another.

The CAFS strategy sets out an approach that recognises the need to tackle the fundamentals of transport-generated air pollution, which is the amount of traffic on the roads, the mixture of traffic and the kinds of combustion engines that are being used. It attempts to define a monitoring and modelling strategy and to create a level playing field across the country, so that people are not

disadvantaged depending on where they are when it comes to the actions that are taken.

The most important thing about CAFS is that it recognises that we need to not just tackle pollution at source but create an environment where there are opportunities to change the whole balance of transport behaviours. That means making it easier for people to choose healthier options, such as active travel—cycling and walking—as opposed to resorting to a private car. Obviously, if people change to public transport, that is also a way of reducing the total amount of air pollution, because if we get people out of their cars, we reduce the amount of emissions associated with using them.

CAFS sets out a range of options, but they all have to move along in parallel, rather than there being a focus on one particular area to the exclusion of others. It is challenging for local authorities to try to effect changes at local level that can make a big impact. There are likely to be relatively small incremental impacts that, in many ways, are quite difficult to measure. It will take time to do it, and it is an incremental process.

Peter Chapman: We have heard how the diesel engine has been proven to be much more polluting than was originally thought. However, one thing that has been happening on farms with lorries and tractors with bigger diesel engines is AdBlue technology, which cleans up the exhaust systems. Surely that is one way that we can help to clean up the diesel engine.

Dr Ramsay: I would not claim to be an expert on the technicalities of engine emissions or their control systems. All I would say is that, yes, I think that there are ways to retrospectively fit even relatively dirty engines with mechanisms that try to reduce the amount of pollutants that they put out.

There has been a steady progression in the car industry of developing engines with reduced pollution. Catalytic converters, particulate filters and all the rest of it are ways that the industry has tried to do that. That question is particularly important in relation to buses, for example. One of the big issues is the role of buses in the whole picture. David Begg, who used to be a councillor in Edinburgh and who is now recognised as an expert in transport pollution, has written about that recently. A lot of benefit could be achieved by retrofitting buses with the technology to clean them up, as opposed to everybody having to buy new buses, which would be colossally expensive and probably not affordable for many organisations. Peter Chapman is right that there is a role for a technological solution, but that is a relatively short-term solution. We are trying to look at the longer-term solutions.

10:15

Fintan Hurley: I support and emphasise what Colin Ramsay said about the importance of policies that make it easier for people to avoid using cars, for example. Public transport is one of those. Colin's submission also quotes from "Cleaner Air for Scotland" on what is called modal shift, and he mentioned moving towards ways to make it easier for people to walk and cycle. The committee's next panel probably has more expertise on that—certainly more than I have—but a commitment to spend a proportion of the budget on transport infrastructure and making it simpler for people to walk and cycle would help to push that idea and move it from being a nice objective to something much firmer.

David Stewart (Highlands and Islands) (Lab): I have an observation rather than a question. Peter Chapman is right that diesels are not all the same. Models meeting the Euro 6 emissions standard, for example, are much less polluting. It would also help if car manufacturers were honest and up-front about their testing of vehicles so that we were not in the situation that we have had with Volkswagen and others who have frankly been fraudulently involved in the system, which has not been adequately checking vehicles.

From my point of view, the political solution is to have bus regulation, which would give the local authorities much more control over buses. It is almost madness to have polluting diesel vehicles in city centres when we should have fleets of electric vehicles. In my patch in the Highlands and Islands, Stagecoach has a fleet of electric buses that are not polluting. There is a way forward politically. My understanding is that it is not really a policy question for the academics—it is more a question of what we in the Parliament can do to ensure that pollution levels fall, and I think that bus regulation is the way forward.

Richard Lyle: Fintan Hurley has touched on my next question, which refers to the Scottish Government's cleaner air for Scotland strategy, the national modelling framework and the national low-emission framework. Does the panel have a view on the process for putting the NMF in place, and how it will support decision making around place making and transport planning in relation to air-quality management?

Fintan Hurley: I will be honest—the people on your next panel will have a much more informed view of that than I have.

The Convener: That is very honest—thank you.

Richard Lyle: My last question is whether anyone has a view about the timescale for delivery of the NLEF, whether the budget is adequate, and how the evidence that is gathered will inform decision making.

Janice Milne: Again, that question is more appropriate for the second panel.

Richard Lyle: I may come back with those questions later.

Emma Harper (South Scotland) (SNP): I am interested in health, and the impacts of pollution on the environment and health. The written evidence that we received from Health Protection Scotland noted that average levels of the harmful particulate matter—$PM_{2.5}$ or less—are lower in Scotland than in the rest of the UK. However, the number of deaths that are attributable to poor air quality is almost 3,000 a year, but it is hard to quantify or directly relate those deaths to air pollution. How can we accurately estimate the human impact of air pollution, and how might the understanding of air quality and its multiple influences be improved?

Professor David Newby (University of Edinburgh): When people look at population risk and attributable risk, they tend to look at the proportionality and make a calculation. If the average blood pressure of Scotland went up by 2mm of mercury, the number of people who would have strokes would go up. When we look at the quantification of the risk, it is applied to a population and that is where those numbers come from—from the background pollution levels that we have.

As Fintan Hurley said, no level of air pollution is absolutely safe. The calculation comes from looking at and making extrapolations from the levels that we have in Scotland. It is a ballpark figure. It roughly says what people are dying from. That is usually not from cancer, which was mentioned earlier, but from a condition that is more my domain: heart attacks. The main killer associated with air pollution is cardiovascular disease.

Emma Harper: I forgot to mention my interest in the topic, in that I am the co-convener of the cross-party group on lung health and I also have a background as a nurse.

People associate air pollution deaths with chronic obstructive pulmonary disease exacerbation. It is interesting to hear about the cardiac deaths associated with air pollution because of the particulate matter that gets into the bloodstream and that it is not just the lungs that are affected. I am interested to hear a wee bit more about air pollution as the cause of that.

Professor Newby: My research over the past 10 years, funded by the British Heart Foundation, involved working with people with lung disease. I went to colleagues who were respiratory physicians and treating people with COPD. It was noticed that people with COPD were dying from air pollution events, but actually they were dying from heart attacks. They clearly had exacerbations of their disease, but the mortality was attributed mostly to cardiovascular events—that is, heart attacks.

We have found that people who come in with heart attacks are three times more likely to have spent the previous few hours in busy traffic before they had the heart attack. So there is an association with the triggering of heart attacks. There is also an association with long-term exposure, which makes it more likely that people will have heart attacks and strokes.

I am talking about heart attacks because that is my field, but similar associations have been reported in relation to respiratory disease.

The Convener: There is a suggestion in the written submissions that research has shown possible links between air pollution and obesity. Is that simply because breathing issues can lead to a lack of activity being undertaken, or is there something more direct at work?

Professor Newby: It is difficult to demonstrate causality there. If the air is more polluted, people do not go out as much, so they might lead a more sedentary lifestyle. Believe it or not, there are animal models that have suggested that the risk of diabetes and what we call the metabolic syndrome—a collection of obesity, diabetic tendencies, higher blood pressure and so forth—is much higher in animals if they are exposed to high levels of air pollution. On one level, there seems to be some causal association. That has also been implicated as a reason why people are potentially more likely to have heart attacks.

Our work has looked at how the blood vessels respond following controlled exposures to diesel exhaust, including from tractors and other engines. Certainly, the effects of inhaling air pollution, particularly diluted diesel exhaust to levels that would be found on Princes Street on a still day, cause problems such as increased blood clotting and blood vessels becoming more constricted. In patients with heart disease, we also see worrying signs of increased stress on the heart when they are exposed to the dilute diesel particles.

Fintan Hurley: I will make a couple of remarks on two points. One is the estimate of the number of deaths; the other is the wide variety of effects caused by air pollution, which David Newby has been talking about.

On the estimates of the number of attributable deaths, we need to separate two things. The first is the size of the public health problem that is caused by air pollution and leads to people dying earlier. The second is how many individuals are affected. It is important to separate those two issues because air pollution is one cause among many. It is hard to say that an individual was killed

by air pollution, because so many other things will have contributed to their dying earlier.

I chaired the London-based Committee on the Medical Effects of Air Pollutants that came up with the estimate of the equivalent of 29,000 deaths from air pollution in the UK, with a corresponding number for Scotland. We made that distinction. The way that I think of it is that, if air pollution shortens my life a little and that of several other people here, it is hard to say that air pollution has killed any one of us, but if we add together all the bits by which people's lives have shortened in Scotland, that is equivalent to air pollution killing more than 2,000 people a year. If we could take the same amount of loss of life and attribute it to a small number of people who are killed by air pollution only and nothing else, we would get a number of about 2,000. There are uncertainties around the estimation, but it is a solid idea and it is good for comparing with other things such as road traffic accidents, where we can be more sure about what is causal.

In the UK-wide study, we came to an estimate of 29,000 deaths attributed to fine particles. It is a bit of a guess as to how many individuals are affected—it could be that 200,000 people who die every year, which is around a third of all deaths, have had their lives shortened by air pollution. Using the same ratio, in Scotland, it might be that, for 15,000 people who die every year, air pollution has made some contribution to their dying earlier. However, the figure of 2,000 is a better one for comparing with other things, because air pollution to an extent operates only with everything else.

The Convener: Did you come up with an estimate for the cost to the national health service annually?

Fintan Hurley: No, but other people almost certainly have.

The Convener: George Curley, do you want to add anything?

George Curley (NHS Lothian): No.

The Convener: Okay—David Stewart can ask a brief supplementary.

David Stewart: It will be brief. This morning, I read about academic work by Knight and Howley from the University of York, who said that air pollution is equivalent to life-changing events such as bereavement in its effect on wellbeing. Can you relate to that point?

Fintan Hurley: I am not familiar with it, and it is not how I immediately think of the issue, so I think that I would stay agnostic on that.

The Convener: Colin Ramsay, however, does not want to stay agnostic on it.

Dr Ramsay: I think that I mentioned that in my written submission. It is only one study, and we always have to be wary about findings in one study. If we set it in the context of other studies that have looked at similar things, we find that the evidence base in relation to health and wellbeing is poor in comparison with the very good evidence base on the physical effects of air pollution. It was an interesting study and a headline-grabbing story, with a curious way of comparing air pollution to major life events such as bereavement. If we drill down into it, the publication raises more questions than it answers.

Fintan Hurley: We reviewed for Health Protection Scotland and SEPA the evidence on health and wellbeing in relation to not air pollution but air pollution policies, such as those on modal shift and active transport. There is much more substantial evidence of benefits from policies that reduce air pollution than there is of benefits from the reduction of pollutants.

Alexander Burnett (Aberdeenshire West) (Con): I will move on to data or, more specifically, the gaps in the data. Health Protection Scotland's written submission notes that relatively little is known

"about how much pollution individual people are exposed to in their everyday lives."

I ask Dr Ramsay to talk about the quantum of that gap and how significant it is. Then the wider panel, perhaps starting with Professor Newby, could perhaps talk about how pollution research might evolve to consider individual exposure and how we might go about developing a suitable approach to allow us to plug that gap.

Dr Ramsay: The point that I made in my written submission was that our understanding of the distribution of pollution is very much based on the current concept of fixed-base monitoring sites, and those are relevant only to the immediate locality of those monitoring sites. However, pollution can be modelled, and sophisticated statistical models are routinely used for that. One of the strategies in CAFS is about developing a new modelling framework to allow us to estimate what the pollution is at any given point, such as in a neighbourhood or at a school or whatever. Those are only modelled estimates, although some of them are pretty good models—I am not a statistician, but I think that they are robust. So although we do not have individualised measures of pollution, we can model it to a significant degree.

The point is that people's experience of air pollution differs radically depending on their everyday lives, and we do not necessarily have a terribly good handle on what that degree of variation is. We come up with global estimates of

what we think that people are exposed to and then we come up with estimates of what that means in terms of health impacts, but those estimates are exactly that—estimates. As has been said before, it is difficult to pin down what the exact effect on an individual is, because of all the other factors that affect our health anyway.

10:30

There is some interest in developing personalised monitors. Some studies have been done recently in Edinburgh that involve putting monitors on people and measuring the variations that occur as they walk around in their everyday lives, but that is quite a labour-intensive way of doing things. There are gaps in the market in relation to, for example, transforming your mobile phone into a monitoring device, but there are questions about the accuracy and reliability of such methods.

There is some potential to address the gaps in our understanding, but there is a question about what the purpose of doing that is, to an extent. We could spend a lot of money trying to improve our understanding of individuals' experiences, but we already know that air pollution is bad for people. How much more do we really need to know about the effect on individuals before we have enough detail to say that we need to do something about it in a proportionate way? I would simply pose that question to you.

The Convener: For the record, according to the Scottish air quality database annual report, nitrogen oxide levels away from roadsides are generally going down across the country. Outside identified hotspots, can you quantify the scale of the issue that we face? Is the increasing problem in urban settings far exceeding the decreasing situation away from roadsides?

Dr Ramsay: Again, it might be more appropriate for SEPA to come in on the detail of the results and the monitoring. To my understanding, the issue of nitrogen dioxide is very much related to hotspots, not to the generality of the effects on the general population. Obviously, people move in and out of hotspots, which means that they are periodically exposed to higher levels. There has been a lot of focus on the Hope Street monitor but, to experience the level of pollution that you get at that monitor, you would literally have to stand by that roadside 24 hours a day, every day of your life. Obviously, people do not experience that amount of pollution; they experience a variation on that. We have to bear it in mind that although we have hotspot problems that must be tackled, those hotspots do not necessarily reflect the generality of what people are being exposed to.

Mark Ruskell: I wonder how robust the model is with regard to monitoring at the moment. We will get hotspots outside schools at school drop-off and pick-up times as a result of engines running, and potentially quite vulnerable children will be affected by that. Is there not a case for having a much more widespread network of monitors so that we can increase the granularity of the data that we get?

Dr Ramsay: Again, there have been some studies around that. Some local authorities have put monitors outside schools and have removed them because they found that they were not able to demonstrate marked increases. The school run is a short period of time when the pollution levels rise, but the children then go into school and the pollution dissipates. What is more concerning to me is the location of schools next to busy roads, because there is good evidence of associations with problems arising from that. Anecdotally, I have observed that, in the school rebuilding programme, there is a tendency to move schools closer to main roads than the former schools were. There is an interesting issue about how to integrate planning policy and air pollution policy. We are not necessarily paying as much attention to those aspects as we could be.

Emma Harper: If we are putting nitrogen dioxide monitors in busy areas, it might be an idea to have monitors on lollipop persons in order to monitor their levels of nitrogen oxide inhalation, as they are in those hotspot areas in the morning and afternoon, but then they go home. Would that be something to consider?

Fintan Hurley: A study was done on traffic wardens in Aberdeen. That took place more than 10 years ago, but I can look it up and send a link to you, if you wish.

Emma Harper: The cross-party group has considered the best ways to monitor air pollution. A study was done by the University of Leicester that involved giving a 14-year-old boy a monitor in a backpack that he carried as he wandered around from his home to school, used the bus and so on. The analysis showed that the monitoring brought about behaviour change, with the kid stopping hanging around at the bus stop and instead hanging out at the swimming pool, because lower emissions were registered there.

The Convener: Janice Milne, I seem to remember from evidence that we took previously from SEPA that only a very limited number of these portable monitors are available. Is that the case?

Janice Milne: Yes. We have just 10 of the monitors that we are able to allocate to schools. Generally, because of the way in which the children use them, they break, so there are

probably about six or seven available at any point in time. It is a good way of educating children that pollution levels go up if traffic is idling. There is something in there about behaviour change.

We are aiming to increase the number of those monitors from 10 up to 20. We are currently investigating funding options for that. We do not want to do more communication and raise expectations until we have those in place.

The Convener: When you talk about behaviour change, do you mean parents not driving their kids to school?

Janice Milne: Yes.

The Convener: I will allow Claudia Beamish to come in now, because I know that she wants to develop the theme of young people's exposure to pollution.

Claudia Beamish (South Scotland) (Lab): Thank you, convener. Are there any further comments from the panel on how exposure to air pollution, particularly in early life, can be effectively addressed? What approaches are likely to yield the most benefit? We have touched on directly tackling traffic congestion, particularly from diesel engines, and Peter Chapman has highlighted the possibilities of retrofitting.

Also, there have been suggestions about advising families to avoid busy streets at particular times. However, such a policy seems a bit unrealistic and perhaps draconian, especially when we think of the school run. Are there things for younger people in particular that the panel would like to highlight at this stage?

Fintan Hurley: I will say again that I support what Colin Ramsay said earlier—the most important thing is to bring down the level of air pollution for everybody, rather than developing strategies of dodging around the air pollution that is there at the moment.

David Newby might have something to say about people who are particularly vulnerable—not just young people but people with pre-existing illness. I do not know much about it myself but I know that there are ways of advising people to avoid various kinds of pollution hotspots.

Professor Newby: To jump back a little bit, I was asked to comment on personal monitoring and I think that we have covered most of that ground. We have done personal monitoring, but that tracks physiological effects; of course, that is helpful but I am not sure how helpful it is at the population policy level unless you have a particular issue with a certain pollutant.

Another thing that is not captured in that is exposure. An area might have a certain level of pollution but if you are jogging through that pollution, your exposure will be three or four times higher because you are jogging so you are breathing faster. Even if the concentration does not change, your exposure goes up. That links a little bit to what Fintan Hurley was saying about vulnerable groups. Although it is not quite socially acceptable in this country to wear a face mask, we have done some work on that in China. We have done some interventions with patients who have heart disease and we have certainly seen some beneficial effects of wearing a face mask to reduce personal exposures, their blood pressure and the stress that their hearts are under. Wearing a simple face mask just for one day when walking around town can make a difference. However, that was in the context of Beijing, where the pollution levels are manyfold higher than in Scotland.

I think that the current advice for patients with heart disease, for example, in the UK would be along the lines of saying that we encourage exercise and an active lifestyle, but perhaps a polluted day is not the day to go for a jog or to go cycling through the city centre. You should choose your days for exercise wisely. That is where we are at present.

I have one final comment on the schools side. I reinforce the point that proximity to the road is probably the most important intervention to think about in terms of town and country planning. There is a lot of evidence that the closer you live to the road, the more heart disease you have, and children start to develop heart disease, albeit mildly. Thickening of the arteries can start to develop in the teens.

Fintan Hurley: It is worth remembering that the damage that air pollution does starts very early. It starts in the unborn child during pregnancy. There is a literature and increasing research evidence—which I think is now solid but I am not really up to date with it—that, other things being equal, women who live in areas of higher pollution are at greater risk of prematurity and babies of lower birth weight for the same number of weeks at birth. The damage starts really early. I can send the committee a link to or a copy of a recent research report.

There is quite solid evidence that someone who cycles in the kind of pollution that we have here increases their exposure because they are breathing faster, as David Newby explained; they are also at increased risk of traffic accidents, although they will have gained some physical activity. The gains from that physical activity massively outweigh the other two disadvantages, except in some places, such as Beijing; however, for Scotland, it is no contest.

The Convener: Thank you. We have covered that quite well. Peter Chapman wants to move on to something completely different.

Peter Chapman: I would like to explore the impact of pollution on the wider environment. We know that pollutants can travel long distances in the atmosphere before being deposited on our countryside and the deposition of acid and nitrogen-rich pollutants can damage habitats by acidifying the soil and water, and also by increasing the availability of nitrogen. That can affect the type and number of species present. What are the impacts on ecosystems of nutrient enrichment and acidification? Which ecosystems are particularly vulnerable to that?

Janice Milne: It will probably be best if I come back to the committee with details of specific ecosystems. Lichens and mosses, for example, are impacted by acidification. Forestry has also been damaged by acidification.

The recovery relates to the impacts on the soil and its ability to neutralise those impacts. In south-west Scotland, for example, the soil is taking longer to recover from the impact of acid rain than other areas in Scotland because the composition of the soil is not as able to neutralise it. Although we are seeing some reductions in emissions of SO_2 and associated acid rain, the ability of different areas of Scotland to recover varies.

I will come back to the committee with information about specific ecosystems.

Peter Chapman: That would be useful.

How might air pollution from intensive agriculture be tackled, and do environmental impacts tend to be considered to be less important than health impacts?

Janice Milne: The issues with intensive agriculture very much relate to particulate matter, certainly when we look at poultry. It is one of the areas in which we have put quite a bit of emphasis on evaluation. We ask operators to model and we want to do some monitoring to evaluate whether the models are accurate. We tend to focus on particulate matter because of the health issues, and the level of impact on health allows us to demonstrate the impact in the environment. That is our focus at the moment, but it is fair to say that there is still quite a bit of work to be done.

There are issues with intensive agriculture in areas where there are sensitive receptors, and what I mean by that is sites of special scientific interest that conservation agencies say are susceptible to critical loading. We have referred to ammonia before. We have to see what the areas are susceptible to and get an understanding from the conservation agencies of the ecosystems there. We have controls over intensive agriculture, and we need to do some more monitoring to evaluate the accuracy of the model.

10:45

Peter Chapman: Finally, how much of the air pollution in Scotland is estimated to come from the rest of the UK and Europe? Are there any figures for that? Do you have any ideas about how the pollutants move in the air?

Janice Milne: I am sorry, but I cannot give you the figure off the top of my head.

The Convener: It would be useful to have to hand any information that you might have on that.

Finlay Carson: That issue is quite important, because we need to find out what we can actually do here. You mentioned the acid rain in Dumfries and Galloway; I am very aware of the damage that that caused, but it would not matter what actions we took to improve air quality in Dumfries and Galloway, because we would still have to deal with those kinds of effects. It is vital, therefore, that we know how much control we have over our air quality in Scotland and what effect we can have in that respect.

The Convener: I suppose that the reverse is also true: air pollution in Scotland could be travelling elsewhere. As a result, we still have the responsibility to tackle the matter.

Janice Milne: That is one of the reasons why we have the national emissions ceilings directive, which was put in place to implement the Gothenburg protocol. It relates to emissions ceilings and mass amounts and sets actual quantities for ammonia, volatile organic compounds, NOx, SO_2 and particulate matter. The UK has a limit that we measure through our national emissions inventory; we are below our targets, but the situation relies on other European countries and others meeting the Gothenburg protocol, too. As I have said, that directive sets the limit for mass emissions.

The Convener: Thank you. Let us move things on. I call Mark Ruskell.

Mark Ruskell: We have already touched on the Scottish Government's cleaner air for Scotland strategy. What do you think are its strengths and weaknesses?

Janice Milne: One of its strengths is that it brings together for the first time a number of different policy areas, such as transport, climate change, communication, legislation and health. The strategy's first purpose was to be cross-governmental; indeed, it was edited by not just the environment minister but the transport minister. For the first time, there was a recognition that this matter cannot be sorted in isolation. We need to sort out our land use planning, and we need to ensure that when we take decisions on climate change those decisions are not having an adverse effect on air quality.

Moreover, we need to get the health messaging right. Communication is key; after all, air pollution is not something that can be seen—it is not, for example, just dirty smoke coming out of a chimney—so what is the best way of selling the multiple benefits of good air quality? It is all about achieving a modal shift, which, as we have said before, could be about getting people out of cars and getting them into active travel.

One of the strategy's key strengths was that for the first time—perhaps ever—we had a cross-policy group. However, it is still at an early stage, and we know that we face a lot of challenges in ensuring that what we do as we move forward gives us the biggest benefits.

Mark Ruskell: What are its weaknesses?

Janice Milne: You could point to challenging targets and where the resources are coming from to enable local authorities to fulfil their roles. Those are not necessarily weaknesses; one could, I suppose, call them a challenge. The timescales are challenging.

Mark Ruskell: Do the rest of the panel have any views on the matter?

Fintan Hurley: I support what Janice Milne has just said about the importance of integrated policy making; indeed, the issue is mentioned in the background papers, too. It is hugely important. I am also glad of the focus on exposure reduction for everyone instead of just hotspots, but I think that the next panel will have better informed views than I have on implementation.

The Convener: Richard Lyle has a brief supplementary.

Richard Lyle: I have a question for George Curley from NHS Lothian. When people arrive at accident and emergency, do you monitor whether they are there for reasons to do with air pollution? If so, do you pass on that information to SEPA to show that there are hotspots that are not being monitored?

George Curley: I am not aware that we collect any of that type of data.

Richard Lyle: So, NHS Scotland does not monitor anything with regard to air quality.

George Curley: I am not aware of that. I think that that is more a question for David Newby. From my point of view, however, no.

Richard Lyle: That is interesting—thank you.

Dr Ramsay: You asked whether we try in some way to ascertain whether what people turn up at A and E with is attributable to prior circumstances. From an NHS perspective, it is simply not practically possible to do that, as the staff are at the receiving end, and the question relies on an understanding of the environment that the individual who has been admitted has come from. That is a very complex situation, as it differs for everybody.

The Convener: Yes, and it goes back to the problem to do with the NHS fixing sick people as opposed to tackling the preventive element.

Emma Harper: The Department for Environment, Food and Rural Affairs has a UK air information resource, which is a pollution forecast provided by the Met Office. Basically, it is a pollution map. Are we not able to track high levels of air pollution and correlate them with the number of unplanned hospital admissions? About £1 billion a year is spent on lung health in Scotland. I know that it is not all spent on acute exacerbations, but could we not use the pollution map to correlate pollution with hospital admissions?

Fintan Hurley: There are a huge amount of studies worldwide, including some in Scotland—I can look some out; there are certainly some in Edinburgh, and probably some in Glasgow—on the effects of what we call short-term air pollution, by which we mean how day-to-day levels impact, in the days immediately following, on death rates, hospital admissions and small changes to the functioning of the heart and lungs and so on. There is a massive amount of evidence about that. That is not the main driver of the public health problem; the main driver is long-term exposure for everybody. However, short-term pollution is an important element, with very important supporting evidence. I guess that, between David Newby, Colin Ramsay and me, we can give you some links to how it has been studied in Scotland and elsewhere.

The Convener: I think that Colin Ramsay wants to come back on that subject.

Dr Ramsay: No—what Fintan Hurley has said covers the point adequately.

Professor Newby: Although we can find associations, they are not necessarily causal. One of the things that Scotland has done very well, however, is the ban on smoking in public places. I know that that is not what we are talking about today, but second-hand smoke is a form of air pollution. As Jill Pell at the University of Glasgow showed very nicely, the rate of myocardial infarctions—heart attacks—was reduced by about 17 per cent across Scotland following the coming into force of that legislation. That is a nice example of a policy decision having a very positive effect on health.

What if we were to dream that we could get diesel engine emissions down? That is what most of the Scottish population is exposed to. People are mostly urbanised. I am not saying that we should not worry about the rural aspects of what

we are talking about today, but if we consider the population levels, urban areas are where people live and work. They drive to work and they take their kids to school. If we could sort out transport emissions, that would be a real winner. We have shown before that we can make a difference and we have shown where policy decisions can be really impactful.

The Convener: That is very interesting.

Mark Ruskell: On that point, let me return to the cleaner air for Scotland strategy. Janice Milne talked about the lack of resourcing that local authorities have to take action. Is this generally an issue with transport? Are the right transport choices and incentives actually there for people? Is the issue one of investment in policy choices for our infrastructure, or is it about something else?

Janice Milne: When I mentioned resourcing, I was saying that it is probably a challenge overall, rather than in one specific area. The witnesses from local authorities, on your second panel, will be able to comment on the funding aspects.

The Convener: Are you happy with that, Mark?

Mark Ruskell: Yes. We will come back to that.

The Convener: Let us move on. David Stewart has a question.

David Stewart: London has led the way with the introduction of low-emission zones. As the panel will know, it is also planning ultra-low-emission zones in 2019. What evidence is there—in the UK or beyond—that the introduction of LEZs is effective in reducing local pollution levels?

The Convener: Who wants to pick up on that? I am looking at Fintan Hurley.

Fintan Hurley: I feel as though I ought to know, but it is not something that I am really up to date with—I am sorry. There will be two questions: one is whether there is a demonstrated impact on air pollution concentrations, and the second is whether there is a demonstrable impact on health as a consequence of that. I will be honest; that is not an area that I have read into.

David Stewart: On a related point—and I will guess the answer to this question as well—is there any evidence on the cost benefit ratio? I picked up that the London scheme cost around £100 million to set up. Committee members and panel members will know that the scheme is done through a camera system that recognises number plates; if a vehicle meets the Euro 6 standard, there is no charge, but if it is an older one that is more polluting, there is a charge. That is expensive to set up, but it has been argued that it has been very effective in London. Is there any evidence about cost benefit ratios in that scheme?

Dr Ramsay: The National Institute for Health and Care Excellence, which provides guidelines in England, recently looked at the evidence in relation to interventions on air pollution and health and reviewed the evidence on cost effectiveness. It concluded that there is evidence that the scheme is cost effective, and it came up with a figure for that.

David Stewart: I am also interested in hearing from the panel about other interventions that can be made. For example, there could be a scrappage scheme for old diesel vehicles, diesel buses could be banned in urban areas and replaced with electric buses, or we could have consolidation centres, following the Dutch model—panellists may be aware of it—whereby heavily polluting delivery lorries go to centres outside cities to deliver goods, and non-polluting electric vehicles are used to take goods from there into the cities. I visited a consolidation centre during the previous parliamentary session and thought that it was an excellent model. I am not suggesting that such measures are zero sum—in other words, we could have low-emission vehicles and scrappage schemes—but I welcome panellists' views on the various options that I have put forward.

Fintan Hurley: As I said, that is an area that I have not read into, but implicit in the question is the importance of policy making being done not on a narrow basis but in the round.

One of my colleagues did a health impact assessment on the LEZ in London, before its introduction and when it went to public consultation. I am strongly in favour of such zones, but when the scheme went to public consultation one of the issues that came up was the example of a small local charity that runs a people-carrier vehicle that takes older people to a lunch club. If we were to ban such vehicles on air pollution grounds without offering measures such as a scrappage scheme and help for the charity to get a better vehicle, so that it did not end up having no vehicle at all, we would have health down sides as well as health advantages. Such schemes are good in principle, but the unintended consequences need to be thought about.

Finlay Carson: The Scottish Government's "Draft Climate Change Plan: the draft third report on policies and proposals 2017-2032" contains an undertaking to work with local authorities to introduce LEZs. Will the panel give their opinions on whether that is a positive move, and what down sides there might be?

The Convener: Does no one want to comment? Are there no down sides—or positives?

Fintan Hurley: I have nothing to add to the little that I have said.

The Convener: Okay, thank you. Let us move towards wrapping up this discussion. I direct this question towards David Newby and Fintan Hurley, in particular. If you were to be offered one thing that could be done to bring about noticeable improvement in health in relation to air quality, what would that be?

Professor Newby: In an ideal world, the centres of Glasgow and Edinburgh would be pedestrian zones with cycle pathways. The cities would spend £1.95 billion not on trams but on cycle pathways, which make a city pleasant and enjoyable and give the physical benefit of health.

11:00

I will be self-righteous and say that I have always cycled to work. I cycle in a suit—to say that people cannot cycle because they wear a suit is nonsense. My wife cycles to work and we barely use the car.

It is easy to say that those things can be done if we get the right environment, and I know that it is difficult to convince lots of people to give up cars and get on bikes. Surely the way forward is a city centre environment that people cannot cross easily with a car, and which has lovely big cycle pathways like those in Holland. That is my dream.

The Convener: Would we get enormous health benefits from that?

Professor Newby: We would indeed, as Fintan Hurley has pointed out.

Fintan Hurley: My suggestion is social rather than environmental, and we are along the way with it. It is for integrated planning that is properly resourced and supported by political will and that is not only top down but bottom up, which involves people understanding the health and wellbeing issues and knowing that something can be done about the matter, even though it is complex.

The Convener: I thank all the witnesses. Those people who undertook to supply follow-up evidence are reminded of that; it is most appreciated. I suspend the meeting for five minutes while we bring in the next panel.

11:01

Meeting suspended.

11:06

On resuming—

The Convener: We will now hear from our second expert panel on the effectiveness of policies and management strategies in relation to air quality in Scotland. We are joined by: Emilia Hanna, from Friends of the Earth Scotland; Vincent McInally, from the sustainable Glasgow initiative; Will Garrett, from City of Edinburgh Council; Tom Rye, from Edinburgh Napier University; and Anna Heslop, from ClientEarth. I welcome you all. As I said at the start of our first panel session, if we keep questions and answers short we will be able to cover the great deal of ground that we want to cover in the next hour or so.

What progress have we made in achieving air quality targets in Scotland over recent years? What changes or improvements have we seen? Are we on track to be a European leader—or otherwise—on better air quality?

Emilia Hanna (Friends of the Earth Scotland): I will put the issue in context. We have two streams of regulation on air quality: the Scottish statutory standards and the European legal limits. As you heard earlier, there are 38 air quality management areas, which are areas where the Scottish standards are being broken, long after the deadlines for meeting them. Twenty-three air pollution zones have been declared for particulate matter; the deadline for the achievement of the standards in that regard was 2010. Twenty-seven zones have been declared for nitrogen dioxide, and the deadline for achievement under the Scottish standards in that regard was 2005. It is fair to say that we are a long way behind where we need to be.

We see that as a public health emergency, because, as you heard this morning, the health impacts are incredibly serious. Public Health England has calculated that, every year, 2,000 early deaths are attributable to fine particles—PM2.5.

You asked earlier about the cost of that. DEFRA undertook a cost impact assessment and found that across the UK as a whole the cost is £16 billion every year. When we calculate that roughly on a Scottish basis, we are talking about a cost of around £1.1 billion every year to the Scottish economy from days lost at work and costs to the NHS. This is a significant health crisis, which we need to tackle much more quickly.

Anna Heslop will be able to talk in more detail about the European legal limits but, to set the scene, European law required us to reach a limit for nitrogen dioxide by 2010. We are now in 2017, and four parts of Scotland are in breach of that binding legal limit. For the purposes of European law, Scotland is divided into six zones, and in four of those areas we are in continued breach of European law, so we are well behind where we need to be. We need much tougher action, specifically on transport, and we can point the finger quite firmly at transport traffic and use of the private car.

The Convener: We are well behind where we need to be, but how does that compare with the rest of Europe? I am not offering excuses, but I want to get an idea of the picture.

Emilia Hanna: Anna Heslop will correct me if I am wrong, but I think that there are 23 zones in the UK. Is that right?

Anna Heslop (ClientEarth): There are 43 zones in the whole of the UK, of which 37 are in breach of the limit values for NO_2 at the moment. We are by no means the only member state that is in breach of the NO_2 limits. There are 23 member states in breach of the limits for either NO_2 or PM or both, so Scotland is not the only place in Europe that is breaching the limits. However, I would not say that you are doing better than anyone else in Europe either.

The Convener: It is useful to have that quantified.

Vincent McInally (Glasgow City Council): It is fair to say that air quality presents a real risk to public health today. However, to get things in perspective, air quality in Glasgow—our largest city—is the cleanest that it has been since the industrial revolution. More than 97 per cent of the city now meets all air quality targets, including the Scottish objectives, which, as we know, are the most stringent in Europe and are more stringent than those in the rest of the UK. We have seen a continual improvement and decrease in the pollution levels recorded across the city over the past five years. We have no exceedance of particulates objectives anywhere in the city and, to pick up on the question about comparisons with Europe, that is really good compared with Europe, which is experiencing over 30 micrograms per metre cubed of PM_{10} particulates. In Glasgow, we have levels of between 15 and 16 micrograms per metre cubed in our worst areas.

There are problems with air quality in the city. They are relatively localised to areas in which there are high levels of traffic, but to be realistic about it, and to answer the question about how we have been progressing over the past few years, the situation has been improving continuously.

Will Garrett (City of Edinburgh Council): I echo Vincent McInally's comments with respect to Edinburgh. We have six air quality management areas, one for PM_{10} and five for NO_2, and the five for NO_2 all show improvement across the city, so the general context is one of an improving picture. However, we are by no means complacent, and there is a range of issues that we need to address to deal with the exceedances that we have in those areas, although the general situation is improving.

Anna Heslop: Although the situation is improving, the problem is that it is a public health emergency and it is not improving fast enough. The directive says that the emissions limit must be met in as short a time as possible, and that is not what is happening. The cleaner air for Scotland strategy, which was prepared in 2015, fed into air quality plans that were prepared at UK level by the Secretary of State for Environment, Food and Rural Affairs in London. The High Court told the UK Government in November last year that those plans were not adequate, and sent it away to redo them, because they do not aim to reduce air pollution in as short a time as possible. It is worth bearing that in mind. It is my understanding that the cleaner air for Scotland strategy is not currently under review. The new air quality plans that were ordered by the High Court in November were due to come out last Monday. They will now come out on 9 May, and it will be disappointing if Scotland's ambition is not increased.

11:15

Angus MacDonald: You will have heard me mention to the previous panel the sulphur dioxide issue in Grangemouth and the fact that AQMAs help to concentrate minds, particularly with Ineos, which invested £30 million in a sulphur recovery tail gas unit. At the risk of being parochial, I want to ask whether you agree that that particular AQMA was the driver that encouraged Ineos to take that action. I am particularly keen to hear from Emelia Hanna, because I know that she has shown a significant interest in the past in the issues in Grangemouth and in other hotspots in Scotland.

Emilia Hanna: I am pleased to hear that progress is being made in the Grangemouth AQMA. I will reflect more generally on AQMAs and what the regime requires of local authorities.

AQMAs can be useful in focusing minds and raising awareness. Under the Scottish statutory local air quality management system, which is governed by sections 84 and 85 of the Environment Act 1995, local authorities are obliged to monitor and declare air quality management areas where there is a risk of exceedance of the standards. However, there is no overall duty on local authorities to achieve the targets, so we have something of an accountability gap. That is perhaps the reason why only four AQMAs have been revoked since the local air quality management regime has been in existence.

We do not necessarily think that the buck needs to stop with local authorities, which should certainly be given more support by the Scottish Government to implement effective measures. One of the weaknesses that we can see in AQMAs is that often a range of measures is proposed that do not necessarily tally up or show

what the expected reductions in any given pollutant are meant to be. For example, for Glasgow's air quality action plan, we cannot necessarily say "Okay, if we take all the measures in the plan, this will add up and secure compliance with the standards." There are certainly gaps within the system.

Vincent McInally: It is worth noting that the entire administrative boundary of Glasgow was declared an AQMA for PM_{10} at one point, because levels of PM_{10} across the city were above the objective. Improvements in air quality have seen that AQMA being revoked, so we now have three separate areas that are AQMAs and we will move this year to revoke the Parkhead Cross AQMA because levels of nitrogen dioxide within that area meet the objective. We are therefore reducing the number of AQMAs as a result of improvements in air quality.

Mark Ruskell: To what extent did the ClientEarth legal challenge in the High Court focus on the Scottish Government's strategies? Was it entirely focused on the overarching UK strategy?

Anna Heslop: It was focused on the overarching UK strategy. The UK Government is responsible for preparing that air quality plan at UK level, but the Scottish Government is responsible for meeting the limit values in Scotland. That is my understanding of how that breaks down. The plan is co-authored by the Scottish Government and it has its logo on it. Obviously, there is some feed-in to the system behind the scenes, but the challenge was against the secretary of state in London.

Mark Ruskell: What needs to change in the Scottish Government strategy in order to deliver on the objective of meeting compliance levels for nitrogen oxides, particularly in areas such as Glasgow that are breaching them?

Anna Heslop: The Scottish Government's cleaner air for Scotland strategy aims for the year 2020, but it is not entirely clear how that date was decided. One of the High Court's criticisms was that the date in the UK Government's entire strategy was not sufficiently close, and that was partly because of the way in which it had decided to do its modelling.

We heard about modelling in the previous evidence session. Two types of modelling are carried out: there is modelling to work out the current air quality situation based on the monitoring that we do and the new model across the country; and, in the context of air quality plans, there is modelling of what air quality will be like and the impacts of different measures on it. That had been modelled on the basis of 2020 and 2025 as dates for compliance, but the court said, "That's not good enough—you have to do it as soon as possible, which could be 2018 or 2019." That is one weakness that I see in the cleaner air for Scotland strategy.

It is not clear from the strategy whether the Scottish Government took the same approach, but the other thing that the UK Government did was to model on the basis of overly ambitious emissions factors for diesel vehicles. We know that in real-world driving vehicles do not emit the amounts of pollution that have been shown in laboratory conditions, but the modelling in question was based on laboratory conditions and on what diesel vehicles ought to be emitting rather than what we know they are emitting in real-world conditions. I do not know whether that is a flaw in the Scottish input, too, because that is not clear from the information available.

Mark Ruskell: Are there any other thoughts on that from around the table?

Professor Tom Rye (Napier University): The cleaner air for Scotland strategy is rather weak in several specific areas on the transport side, particularly freight. We need think only of the contribution of heavy goods vehicles to pollution. All that the strategy has are policies to encourage freight operators to take up cleaner practices, and there is clear evidence from other European countries that it is possible to do more than that. I could go into what you could do later on.

The strategy is also rather weak with regard to trunk roads. Local authorities are not the only ones that control roads; Transport Scotland controls them, too, and I point out that one third of air quality management areas have a trunk road running through them and that they carry a higher proportion of heavy vehicles than the local roads. Moreover, CAFS really makes no commitment whatever on trunk roads, apart from in respect of one specific air quality management area in Crieff—and in that case it puts the onus on the local authority. I could go into further detail on several transport areas in which CAFS is very weak and is not planning to do enough fast enough.

Emilia Hanna: I echo the points that have been made about CAFS being weak on transport. I also point out that it includes very few new policies, despite the fact that the High Court ruling required new measures that showed increased ambition to tackle air pollution.

One of the main things introduced by CAFS was a national low-emission framework, which is an appraisal process for identifying measures, such as low-emission zones, to tackle air pollution. Although that could have been useful, it has been running a fair bit behind schedule. According to one of the actions in the strategy—I think that it is LP10—the national low-emission framework's

"criteria, tests and processes" were meant to have been "developed, agreed, and finalised" by April 2016. We are now in 2017, and the NLEF has yet to be consulted on. It has become something of a stumbling block in delivering the Scottish Government's ambition for a low-emission zone by 2018—which, I should say, is something that we support. Progress through CAFS has therefore been quite slow.

Another weakness with the strategy is that it does not quantify the impacts of the 83 policy measures that it proposes to introduce. As a result, there is no way of knowing whether it adds up to delivery of the legal limits by 2020.

Vincent McInally: On Mark Ruskell's question about the emissions factors in the modelling, it is true that vehicles emit more in the real-world environment than they do in lab testing, but revisions are made to take account of the evidence that we are becoming aware of in that respect.

The Convener: That is useful. Do you have any other questions, Mark?

Mark Ruskell: I am struggling to understand what the Scottish Government should be doing ahead of 9 May, which seems to be a very tricky deadline for it to meet. What should it be doing?

Anna Heslop: My understanding—and the evidence that the UK Government gave to the court last week—is that those plans are ready. In other words, they have already been prepared. I am not sure that the Scottish Government can do anything between now and 9 May.

I am very surprised that, following the High Court judgment in November last year, there was no review of the Scottish plan. I very much hope that Scottish Government ministers have been discussing with their colleagues at Westminster what ought to go into the new, revised air quality plan, but I am not aware of what has been going on behind the scenes.

The Convener: There might have been something going on.

Anna Heslop: There might have been, but there are certain things in the cleaner air for Scotland plan that you would want to look at again on the basis of the High Court judgment. As well as the issues that I mentioned earlier, the part of the strategy on the national low-emission framework talks about a business case. That comprises a fairly large chunk of the national low-emission framework, but the High Court made it clear that that ought not to be taken into account.

The Convener: Does the UK Government accept the latest High Court ruling?

Anna Heslop: It has not appealed it.

The Convener: That is fine.

Professor Rye: There might not be time to do this before 9 May, but I think that CAFS ought to incorporate stronger measures on low-emission zones. If we wish to be a leader in Europe, we should follow the example of quite a number of our European counterparts, including Italy, Germany and Sweden, in having more than one low-emission zone in the country. Low-emission zones can be introduced without enormous political upheaval, so I am very surprised that CAFS does not take a stronger lead on that. Ultimately, the decisions by which LEZs would be introduced would have to be finally approved by the Scottish Government in any case.

Richard Lyle: I turn to air quality governance and the effectiveness of current policy, support and incentives. Emilia Hanna and Anna Heslop said that there is a public health emergency, but George Curley said that the NHS does not really gather data regarding local reporting of pollution. Do we have the right policies in place? Are they sufficiently ambitious? Are they being implemented effectively? Are they successfully addressing the issues? Should the NHS be more involved?

Emilia Hanna: On the monitoring and understanding of air quality, an issue that was overlooked in the session with the first panel is the fact that we have a very detailed network, which is driven by the local authorities and based on diffusion tubes. We have the 95 automatic monitoring stations that tell us what air quality is like on an hourly basis. We also have little cost-effective bits of kit that can show in more depth what the situation on the ground is. We know that, last year, 17 of the 28 locations in Glasgow city centre where nitrogen dioxide is monitored were in breach of the Scottish standard. We have quite a detailed picture.

Local authorities have done some excellent work on source apportionment—understanding where the main sources of air pollution in the urban setting come from. We know that, in the urban setting, traffic is the dominant cause. Across the UK as a whole, on average, 80 per cent of urban nitrogen dioxide comes from traffic. The City of Edinburgh Council did an excellent further assessment report in 2013 that tells us where the sources of the pollution are. We know from that report that, for example, only between 5 and 7 per cent of nitrogen dioxide is from regional background sources. A lot of urban pollution is caused by traffic, and it is within the local authorities' and the Scottish Government's control to do something about that. We have a sufficient evidence base to show us that traffic is the dominant cause, but we still have a lack of political

will and, specifically, a lack of ambition for demand management.

I would like to point the finger at cars. From Edinburgh's source apportionment work in 2013, we know that cars in many cases are the dominant cause of pollution. In some instances it can be buses, but a lot of the time those buses are caused to idle because they are trapped in congestion that is caused by cars. We need—

The Convener: In defence of the poor cars, it is actually people that cause pollution by driving them.

11:30

Emilia Hanna: Precisely. I take your point—we certainly need the policies in place to help people to make the right choices. The priority areas that we see are for cutting car use by enabling workplace parking levies and stricter parking controls. We want to see a roll-out of 20 mph zones as the default in urban settings. We want congestion charging to be looked at, and we want to see a strong network of low-emission zones in not just one city but all major cities that have air pollution problems. Particularly, we want to see low-emission zones that will support buses to make the transition to cleaner emission standards.

The Convener: All of which require buy-in from the public for a significant behavioural change.

Emilia Hanna: There has been a lot of awareness raising of air pollution in the past few years and I think that the public is on board with the fact that it is a problem.

Certainly it is always difficult to have measures that specifically attack the car, but there are other measures that the public would support. For example, last week more than 1,000 people came to the Scottish Parliament saying that they want more investment in cycling and active travel. We know that cycling is a big part of the solution. Again, the public transport sector is in decline; that needs to be looked at. If we can get more buses on the roads, that could be a big way to overcome congestion. We know that, for example, one double decker bus could take up to 75 cars off the road. Those are the things that need investment.

We have to remember that 30 per cent of households in Scotland do not have access to a car. In Glasgow it is 50 per cent. There are a lot of people out there who are trapped in transport poverty who need better public transport and better access to walking and cycling options, and that would benefit air quality as well.

Craig McLaren (Royal Town Planning Institute): Obviously I come from a specific background, as I am here from the Royal Town Planning Institute. One thing that we really welcomed about the strategy is the fact that it put a major emphasis on placemaking. We heard in the earlier session about the need to create healthy places for people. That is great, but the issue that we have had with that is that sometimes the idea of thinking about places is overlooked at a local level. We tend to look at things in terms of programmes, strategies, initiatives and disciplines rather than at how all those things work together at the same time to create that place. We need to be much more proactive and forward thinking in how we do that. There are some very good hooks in the strategy that try to make sure that placemaking works, but we need to make sure that that approach—that strategy and mind-set—is actually implemented at a local level.

The Convener: Would you recognise the comment that was made by the first panel about new schools predominantly being located near major roads?

Craig McLaren: I do not know the details of whether that is the case. The interesting thing about that comment is that the provision of new schools is more than a planning issue—it is an asset-management and finance issue, too. We have tended to find that the head planner is not always involved in all of the discussions at the start of the process. The placemaking element is not there; decisions are made on a financial or an asset management basis.

We put out some proposals recently, as part of the planning review, for what we are calling a chief planning officer to be a statutory post in each local authority. They would be consulted and engaged with early in the process so that they could figure out the implications and ramifications of a decision, whether it is on an asset or an investment. There is a need for that involvement to be front loaded and be put in a much more upstream part of the process.

Professor Rye: I will talk briefly about the politics of introducing low-emission zones. As I said, in Germany, most medium and large towns have a low-emission zone. In essence, they function by banning private cars and commercial vehicles that do not meet certain emissions characteristics or by imposing a small daily charge on those vehicles. That requires people to change or retrofit their vehicle or simply not drive into the area. I am not aware of a wave of political disasters in German local politics arising from the introduction of those low-emission zones, which as far as I am aware has been going on since the early 2000s. Similarly, most cities in Italy have some form of low-emission zone. The people in those countries are accepting the changes.

Freight operators will always raise the issue of the economic impact of any regulation that might require them to upgrade their vehicles. Clearly,

countries such as Germany and Sweden have continued to be economically successful while introducing stricter air-quality management regulations than we have.

Therefore, we need to be circumspect about the possible political impacts or political difficulties of introducing low-emission zones. Steps need to be taken quickly to get more low-emission zones in place.

Vincent McInally: I will pick up on a couple of points. I echo Emilia Hanna's comments about monitoring and data collection. We have the ability to report extensively on the current air quality in our cities. The source apportionment work that we have done with SEPA has thrown up some interesting facts and figures about what is polluting in certain streets, which varies quite a bit within the city. For example, on Hope Street, which is the most polluted street in Glasgow, we know that 70 to 80 per cent of the pollution comes from the buses, whereas on other streets, such as Great Western Road, we know that about 70 per cent of the pollution comes from cars. So the pollution depends on the traffic on a particular road.

It is perhaps better to focus first on the part of the fleet that we need to clean up. Great Western Road meets the air quality objective, so it is clear what we need to target. We want buses to be cleaned up for other reasons and not just to meet the targets. We want people to use public transport, but people who are travelling on buses are exposed to more pollution than those who are in cars, which travel quicker through the areas and do not stop regularly with the door open and the engine running while people get on and off. The bus and taxi drivers who travel through those areas are exposed to higher levels of pollution. It is important that those parts of the fleet are cleaned up.

On acceptability, my personal view is that the public will always be accepting of low-emission zones as long as it is somebody else who has to clean up their fleet. With privately owned vehicles, it is a difficult decision for anyone to say that diesel vehicles that are, for example, six years old now do not comply with emission standards. We are talking about the Euro 6 standard for diesels and Euro 4 for petrol, which would mean that only diesel cars that are a couple of years old would be able to get into a low-emission zone. It would be quite a challenge to sell that to the public.

I know that in Germany and other places across Europe there has been more acceptance of low-emission zones, but they are starting from a different place. As I mentioned, levels of particulate pollution in mainland Europe are far higher than they are in Scotland, which may be the driving factor that has led to the acceptance of low-emission zones. In addition, Germany has handed out a lot of grants for commercial fleets to be upgraded and for scrappage deals for people to replace older vehicles.

There can be unintended consequences of scrappage deals. The most recent scrappage deal that was introduced for cars saw people get rid of older and relatively low polluting petrol cars and replace them with diesel vehicles, which we now know cause a problem. Another point is that a general scrappage deal everywhere would not focus efforts on the areas where we have air pollution problems. If somebody is driving a diesel vehicle in the middle of the countryside, that is having a negligible impact. It is in the city centres that we have problems with diesel.

The Convener: We are getting into low-emission zones, and I will let Dave Stewart develop that theme in a second. We have talked about a small charge for private car users going into low-emission zones, which would perhaps drive behavioural change. Equally, if polluting buses were charged to go into those zones, that could drive change in the practices of the fleet owners. They might introduce hybrid buses or electric vehicles and so on. Do you see that as a possibility?

Vincent McInally: A low-emission zone could be the stick that is needed to make fleets improve. In the past, Glasgow has offered grants to bus operators for fitting abatement technology to their buses that would bring an old Euro 3 bus almost up to the Euro 6—

The Convener: That is in addition to the green bus fund that the Scottish Government runs.

Vincent McInally: Yes. No bus operators in the city took us up on that. We would have provided 80 per cent of the funding, and nobody took up the offer.

There is the potential for grant funding on the one hand and a low-emission zone on the other to encourage fleet operators to improve their vehicles.

The Convener: That is interesting.

Professor Rye: I have some data from a large low-emission zone in Germany. The zone in Berlin covers 1.1 million residents and 85km^2. This data is quite old, I am afraid, but in the first year after the zone was introduced in 2008 there was a 35 per cent fall in particulate matter and a 98 per cent fall in nitrogen oxide concentrations. That covers cars as well as commercial vehicles.

As we have heard, even if incentives are available, it is difficult to encourage bus operators to change their fleets if you have no direct control over those fleets. We should remember that, in the rest of continental Europe, buses are either directly owned by the public sector or secured

under franchise contracts, which gives far more possibilities of control to the franchising authorities to improve the emissions characteristics of the buses. For example, Skåne in south-west Sweden is an area around Malmö of around 1.25 million people that has similar characteristics to Scotland, and it has an almost completely bio-gas fleet because it is a franchise. How much does that cost? The subsidy or public money that goes into the bus industry there is about £90 per head per year, whereas in Scotland we put about £60 per head per year into our bus industry.

The clean bus grant has enabled the improvement of 469 buses of a fleet of approximately 8,000 buses across Scotland, but quite a lot of those are improved to Euro 5 or Euro 6 diesel, and not to anything cleaner than that. In the Skåne part of Sweden, an order of magnitude change in the emissions characteristics of the buses has been brought about because of the different regulatory system.

A transport bill is likely to go through the Scottish Parliament soon and I trust that it will take on board many parts of the Bus Services Act 2017 that has just been made law in England, which will allow the local franchising of bus services and more control over the nature of the bus fleet.

The Convener: That is a really important issue, but we are getting caught up in it.

Professor Rye: Sorry.

The Convener: I will let Will Garrett in because he has been trying to attract my attention for some time.

Will Garrett: On the bus issue, City of Edinburgh Council is a partner in the ownership of Lothian Buses, and by the end of this year, 75 per cent of the bus fleet will be at Euro 5 or better. That sense of having an opportunity to influence what happens is important.

I want to go back to the source apportionment discussion. We have a good understanding now of what the issues are in each particular AQMA, and that means that we can think about how to address particular problems.

Three forms of traffic make up a problem. One is buses, and, as I said, through partnership with the bus operators we can ensure that the fleet is in relatively good order and that the better, least-polluting buses go through the AQMAs. We can address bus pollution through that process. With lorries and vans, we have a more voluntary programme called ecostars in which we work with the operators on how they develop routing and driving to produce fewer miles per lorry or van.

As has been said, the real issue is with cars. No partnership can be made with individual people other than through persuasion. We have a raft of planning policies that we use to encourage a shift from car ownership—a modal shift, as has been discussed—and to promote electric cars and a range of other things that we will no doubt come to later in the meeting. In the broad context of the problem that exists in the AQMAs, we have more difficulty with cars than with any other form of transport.

11:45

Emilia Hanna: I echo Will Garrett's point. Edinburgh's population is expected to grow by 28 per cent by 2037, so we need to think about how to make the most efficient use of our road space. Edinburgh council is not able to introduce workplace parking levies or levies over any large parking spaces, as such provisions do not exist in transport legislation. We make the plea to Parliament that the next transport bill needs to make it possible for local authorities to introduce workplace parking levies.

David Stewart: There has rightly been a lot of discussion about low-emission zones, and I am particularly interested in asking the two local authority representatives and other witnesses about how discussions on that are going with the Scottish Government. Are your authorities in a position to be in the pilot when it is due to start next year?

Will Garrett: Discussions have been on-going. The point that we have come to is that we are not unwilling to participate—Edinburgh council is willing to do it—but we need to understand what the resource implications will be. It would be an additional cost for the local authority and we need to have a better understanding of what that will be. We also need to understand the nature of how, specifically, a low-emission zone would work and whether it would be focused just on buses or on cars, too, because buses are not such a big issue as cars in Edinburgh. Focusing it on cars and buses makes it difficult to do without introducing number plate recognition, which, as we heard earlier, is a very expensive process.

David Stewart: That is interesting. I have done quite a lot of work examining the London model, which is, as you know, bringing in an ultra-low-emission zone in 2019. In earlier evidence, we heard that the cost of setting up the initial scheme in London was £100 million, I think. That scheme uses camera technology to detect vehicle licence plates in order to find which vehicles are Euro 6 standard or whatever, and charges them thereafter. That is a huge amount of funding. Have you had any discussions at the level of detail for you to know whether there will be a camera recognition system for the pilot next year?

Will Garrett: I do not know that level of detail.

David Stewart: I declare an interest in that I have had a letter back from Glasgow City Council about that, but I will not steal your thunder, Mr McInally. In terms of cost, if you were offered the pilot next year, would you be in a position to run it?

Vincent McInally: I am not in a position to make a statement on that—any such thing has to go through our committee process. My role, as team leader of the air quality team, is to carry out the appraisal process for low-emission zones, which should come out through the NLF and the "Cleaner Air for Scotland" strategy. It is not out yet, so we have not yet been able to work through the appraisal process.

We do not yet know what the resources would be for an all-singing, all-dancing low-emission zone using automatic number-plate recognition technology. It is my understanding—as it is David Stewart's—that the London scheme cost £100 million to set up and run for a number of years. However, it is the Rolls Royce of low-emission zones. It is a huge zone. It is the biggest in the world, that I am aware of, which is not the scale that we would need here.

The Department for Transport costed clean-air zones for the five cities in England that were identified through the national air quality plan. It is interesting that the cost for those five cities, which are probably equivalent in size to Glasgow, totalled about £101 million. As a back-of-a-cigarette-packet calculation—that is perhaps not the best expression to use—if we just divide that sum by five, we are looking at about £20 million for a scheme in a city the size of Glasgow. That is only the cost to set up the technology and run the backroom operation and so on for, say, five to 10 years; there is also a cost for operators to make non-compliant vehicles compliant. Retrofitting costs £14,000 to £15,000 per bus, and a new bus costs more than £100,000. There are real challenges in making vehicles compliant within the timescale; for example, it takes about two years from sending in an order for a new bus to arrive, and retrofitting a bus can take three or four days. It is a logistical challenge.

David Stewart: May I ask a technical question? I appreciate that not all the detail has been released yet, but as I mentioned, in London there is 360 degree coverage of vehicles entering and exiting. Does any such system that could be upgraded exist in Glasgow? Is there a camera recognition system that covers any of Glasgow, or would that have to be started from scratch if there is to be a Rolls-Royce solution? I appreciate that there are other ways of running a zone.

The Convener: Before witnesses answer that, can I have clarification? Is Vincent McInally saying that Glasgow—in spite of having the most polluted street in Scotland, and considering the range of options that could tackle that—has not looked in detail at having a low-emission zone? There would be a cost for setting up and running it, but what income could be generated from vehicles that had to pay?

Vincent McInally: There are a couple of things to say about that. First, as far back as 2010 we had a feasibility study done to examine the case for low-emission zones and for which the target area was buses. However, we were not able to progress that because we became aware that the engine technology did not do what it was supposed to do; we could not progress a scheme when we could only get Euro 4 or Euro 5 standard buses, which we knew did not work. Only since the Euro 6 buses came out do we know that we can tackle nitrogen dioxide. The London low-emission zone and others do not have the Euro 6 standard set for them—they have Euro 3 or Euro 4. That would do next to nothing to reduce the levels of NO_2 within Glasgow—the standard has to be Euro 6. We continue to look at that for the city.

I have forgotten what the second part of the question was.

The Convener: It was about the income that might be generated.

Vincent McInally: Such a scheme is unlikely to be income generating, because the idea is to encourage people to improve their vehicles. It is not like a congestion charging scheme, in which we would expect people to pay a daily charge. The idea is that we would set a fine for non-compliant vehicles that enter Glasgow, which would be high enough that people would not want to come in if their vehicle did not comply. It would not be about revenue raising, but about encouraging—

The Convener: Would a scheme raise revenue in the initial stages, when people might fall foul of it?

Vincent McInally: That level of detail of the costing has not been completed.

David Stewart: The convener touched on the point that I was going to raise. In London, the £10 toxicity charge—or T-charge—generates income. As you have probably picked up, I am very enthusiastic about low-emission zones; my issue is the bureaucracy. Will we see a pilot scheme next year? What is it that your local authorities will require from Government in order to make an educated decision about whether to go ahead with a pilot?

Vincent McInally: A pilot of a low-emission zone would be dependent on what resources and funding would be available. As yet, we do not have that information.

Will Garrett: I can only repeat those comments. The City of Edinburgh Council is in exactly the

same situation—we need to understand the resource implications. We have discussed the idea with some of our local politicians; there has been concern about the possibility of displacement to areas around a low-emission zone and what impact that might have on relatively quiet suburban streets.

Professor Rye: I will add that we need to be clear about the bureaucracy of the system and how long it is going to take. Please correct me if I am wrong, but I understand that the enabling legislation would be the congestion charging powers under the Transport (Scotland) Act 2001. When the City of Edinburgh Council developed detailed plans for congestion charging in 2003 to 2005, there was a lengthy process when the city officials who were involved worked very closely with Scottish Government officials to develop the relevant guidance. That took a lot longer than the period between now and 2018.

David Stewart: It is useful to know that there is primary legislation. My final point is about my question on 21 February to Roseanna Cunningham, the Cabinet Secretary for Environment, Climate Change and Land Reform, about how many low-emission zones are planned and whether we could have them sooner. She said:

"Low-emission zones are something that local authorities decide on, so we would need local authorities to look at them."—[*Official Report*, *Environment, Climate Change and Land Reform Committee*, 21 February 2017; c 16.]

I thought that the position was the other way around. If I was a local authority leader, I would want to know the package and what resources are available, so that I could implement the plans through the various council committees. What views do our two local authority representatives have? Should councils bid for low-emission zones? If there is nothing to bid for, how would a pilot be implemented?

Will Garrett: That is exactly the question. We have been in discussions with the Scottish Government about those points—the four main cities have. We still do not know what the offer is. We want to take the best steps that we can to address the issues, but that will be resource-intensive and costly, so we need to understand what a low-emission zone means for a local authority before we commit ourselves.

Vincent McInally: I echo that point. I also ask whether there will be grant funding or assistance available for fleet operators to improve fleets? The costs will not be just for local authorities, but for the bus operators, which will almost inevitably pass the costs on to customers, if there is no assistance. That may lead to people not using buses and returning to the car, because people always operate in their own best interests. If bus fares go up and it is cheaper to take the car instead, we will have a problem. We want people on buses—cleaner buses.

On legislation to introduce low-emission zones, it is my understanding that traffic regulation orders would be used. A TRO can take a considerable time for a local authority to get through if there is an objection, especially if it is controversial or if there are challenges; delays resulting from the appeals process are not unusual and can drag on for a year or two.

The Convener: Before I move the discussion on to the rural sector, Emma Harper has a brief supplementary question.

Emma Harper: Have there been any thoughts about car-pool lanes for specific times or days, or for electric vehicles, or about incentives for employer reward systems for car sharing? In a previous job, I found that that approach worked. Is it an option?

Vincent McInally: Those approaches fit into travel planning for larger employers. Glasgow City Council has a travel plan and we set conditions—which can include those ideas—through the planning process for certain developments to have in place travel plans for staff.

Glasgow roads are relatively narrow; they are not wide enough to make space available for additional lanes for car-pooling or car sharing. To do so would create more congestion, slow traffic and, potentially, increase pollution levels. The quality of the vehicles that are on the road is an issue, and the city's topography is one of the biggest problems, because high-rise buildings create canyons that prevent pollution from being dispersed. The trunk roads may have options, but those roads are not controlled by the local authority, and I cannot really answer on a Transport Scotland matter.

Peter Chapman: I will change the focus to agriculture for a wee while. We know that NO—nitrous oxide—emissions are 31 per cent of agricultural emissions, but we also know that nitrogen it is an important input to agricultural production. Usage of nitrogen has been falling for the past number of years, so how can we continue to use it more efficiently in agriculture? Are NO emissions rising, falling or static?

The Convener: I will bring in Professor Bob Rees, and apologise because I did not mention him at the start of the session.

Professor Bob Rees (Scotland's Rural College): That is no problem. I will answer that question, because I work on agricultural emissions. It is worth clarifying first what the emissions are.

12:00

It is worth clarifying first what the emissions are. Today, we have talked a lot about nitrogen. It is a complicated element to get your head around. Agriculture is responsible for emitting small amounts of nitric oxide—it does not emit nitrogen dioxide, which is the gas that we have been talking about in urban settings, but nitric oxide can be oxidised to produce nitrogen dioxide in the atmosphere. It makes a small contribution, but it is not significant relative to the transport emissions.

As has been mentioned, agriculture emits large amounts of nitrous oxide, which is a completely different gas. It is a greenhouse gas that does not have a direct impact on human health; it has only an indirect impact through the climate change impacts that it causes.

The other nitrogen gas that agriculture is responsible for emitting is ammonia, which we heard a little bit about from the first set of panellists. In answer to one of the questions, a member of that panel said that ammonia emissions from agriculture are increasing. We are going to suffer the consequences of not reaching ammonia emissions reduction targets—and ammonia causes all sorts of problems. It is an indirect greenhouse gas that causes problems for biodiversity, causes acidification and so on. There is a raft of issues related to ammonia.

Peter Chapman's question was also about how we can continue to use nitrogen in agriculture in a more environmentally friendly way. That is a complex matter. Nitrogen is critical to agriculture—our production systems are dependent on inputs of nitrogen in many ways, so we need to continue to use it. However, there are lots of small steps that we can take to increase efficiency in nitrogen use, including technical fixes and more efficient farming processes. Farming continually improves its efficiency; we are seeing precision agriculture coming through, which will help.

There is probably no magic bullet, and some of what we need to do will be costly. We have done a cost analysis of various measures. Some things can be done at low cost, but for other things the costs start to increase, so there is an issue about how we get finance into the industry to support that.

It is not all about supply: demand—what products people want to eat from our food industry—is also an issue. Meat products, for example, are associated with higher inputs and emissions than plant-based products are. Trying to reduce emissions is about both supply and demand.

The Convener: If I recall correctly, the evidence suggests that changing behaviours in the agriculture setting saves money, so there is a benefit to doing that.

Professor Rees: Absolutely.

The Convener: In the previous session of Parliament, there was a push to introduce mandatory carbon audits from a climate change perspective. I wonder to what extent carbon audits might be beneficial to air quality.

Professor Rees: Carbon audits in agriculture are designed to promote the increased efficiency that I have been talking about. They make farmers and landowners aware of the emissions that are associated with their enterprises. Audits would be designed primarily to improve nutrient-use efficiency and to reduce emissions of greenhouse gases, so they would not have a direct health benefit, other than through the efficiencies that would be achieved by reduced ammonia emissions.

The Convener: It was useful to have that clarified.

Peter Chapman: You said that ammonia emissions are rising, but you did not answer my question on whether nitrous oxide emissions are rising, falling or static.

Professor Rees: Nitrous oxide emissions have been pretty static for the past three or four years, although the last year for which we have a report—2014—showed a small increase. Emissions from agriculture are increasing as a proportion of total greenhouse gas emissions.

Peter Chapman: I have just—

Claudia Beamish: I am sorry to interrupt Peter, but can I just come in on that briefly?

Peter Chapman: Yes—go on.

Claudia Beamish: Why are ammonia emissions rising? What can we do about that?

Professor Rees: Ammonia emissions are rising because we are not really doing anything to tackle them; no such measures are being encouraged in the UK. Other countries are more proactively trying to reduce ammonia emissions. We could take measures but they cost money, which precludes our taking a lot of measures.

Peter Chapman: I am a farmer, and I recognise that using new technologies such as accurate soil mapping and targeting inputs as a result can make a huge difference not just to the environmental impact of agriculture but to the bottom line, because doing things properly saves money, as the convener said. What research is being carried out into such practices? How much progress is being made on understanding the opportunities for mitigation and for improving the reporting of emissions?

Professor Rees: We have made a lot of progress in the past five or six years through improving the modelling of emissions from agriculture; that has helped to identify where we should target mitigation opportunities. There are still big uncertainties to do with emissions of greenhouse gases and pollutants from agriculture, because of the biological nature of the processes that we are dealing with. We are not talking about engines or technical fixes that we can introduce; the pollution sources are much more diffuse.

You mentioned precision farming, which is being promoted a lot in the industry. It provides some potential for improved efficiency, but the research to demonstrate reductions in greenhouse gas emissions, for example, is still at a fairly early stage. That is one of the things that we are working on, and we hope that within the next few years we will be able to quantify the position; at the moment it is difficult to put a number on it.

Mark Ruskell: Does the planning system adequately take account of air quality issues? We heard earlier about the pressures under which councils find themselves when planning schools. Yesterday, I met a group of constituents in Scone who are concerned because they face a number of housing developments locally. Individually, the developments would not be assessed for their impact on air quality, but collectively, they could make a significant difference, particularly to the nearby air quality management area at Bridgend, and they could have an impact on health. The issue does not seem to have been dealt with in the local development plan process and it does not seem to be adequately addressed in the local transport strategy.

I am hearing about other such examples from around Scotland of the planning system not adequately dealing with the impact on air quality. Will Craig McLaren talk about that and say how planning reforms or tweaks to the system might improve things?

Craig McLaren: There is a policy context of sorts for planning and air quality—the national planning framework and Scottish planning policy refer to air quality, but they were published before the cleaner air for Scotland strategy was announced, so there is a bit of work to be done. There is also a timing issue, in that many new-style local development plans are still being developed and have not yet been adopted. Issues such as air quality, which was probably not considered in earlier versions, are starting to be considered now.

That said, planners are trained to look at the cumulative impact of a range of developments. We need to think about how the approach can be made to work in practice. We have been working with Environmental Protection Scotland and SEPA, and in January we published a guidance note for local authority planners and people who work on air quality to try to improve understanding of how planners can deal with air quality issues. There is now much more detailed guidance and I am happy to provide a copy of the guidance or a link to it, if the committee wants to see it.

We have thought about how to introduce training for planners in particular. To go back to a point that I made earlier, one issue is that there seems to be a feeling that planners are the silver bullet that can solve everything. Planning is not a silver bullet; it sits in the broader local government and public sector landscape, and many other aspects of the landscape have more impact than planning does. We have therefore been trying to ensure that air quality is also addressed at a community planning level. As the committee knows, community planning brings together many public sector bodies and organisations to align approaches and pull together resources to make things work more effectively. The issues need to be looked at more broadly—it is not just about the planning side of things.

Will Garrett: Planning is close to my heart, as I am a planner by discipline. I now have responsibility for developing the local transport strategy and for air quality and place making. In the reorganisation of the City of Edinburgh Council, the need has been recognised to bring together those disciplines in order to have a serious impact on outcomes. We are all really concerned about outcomes, and they are largely driven by the health agenda.

In thinking at a strategic level about how we can improve outcomes for people in our towns, cities and countryside, it is necessary to bring together all those disciplines, as has been said in “Cleaner Air for Scotland”, in the review of the planning documentation and in the review of the national transport strategy, which all talk about that. The timing has been good for us in Edinburgh because, as part of the response to the cuts that we have had to make, we have reorganised ourselves in a way that can help to deliver things in a co-ordinated and coherent way. That is the first point that I wanted to make.

On more detailed planning issues, the local development plan guides growth to locations that are accessible for active travel and public transport. That is part of the process of identifying growth areas. The local development plan is supported by the action programme, and the council’s latest action programme sets out about 90 site-specific active travel actions that can take place to give people an option, when they go out of their front door, as to whether they get into their car, use a bike, walk or go to a park-and-ride site.

Giving people options is part of the answer to addressing the issues through planning.

Professor Rye: I have two points. In "Cleaner Air for Scotland" the Scottish Government made a commitment to review the guidance on regional and local transport strategies. I think that the guidance on local transport strategies was produced in 2000. I have seen no such review since "Cleaner Air for Scotland" was published, so perhaps that could be recommended.

I emphasise the incredible importance of land use planning in people's travel choices. An example of a cycling city that is often brought up is Groningen in the northern Netherlands, which has a very high cycling mode share. I emphasise the importance of planning in bringing that about. A long-term planning strategy has ensured that 78 per cent of residents live within 3km of the city centre and 90 per cent of employees work within 3km of the city centre. Those journey distances are easily made by public transport, on foot or by bike. At the same time, it is important to bear in mind the nature of the Dutch planning system that can bring that about, which is basically more public sector led than our planning system is.

Mark Ruskell: On the important place-making agenda, we have seen the gradual roll-out across the whole of Edinburgh of area-wide 20mph speed limits, which have been applied to a lesser extent in Glasgow, too. To what extent is that factored into your work on place making, air quality and active travel? Is it seen as a significant intervention?

Will Garrett: It is. It is part of a range of tools that we have at our disposal. Of the council's transport budget, 10 per cent now goes towards active travel, and that is apart from the cost of implementing the 20mph zone.

Place making is critical. If we create the kind of places that people want to be in, they will necessarily be pedestrian-dominated places, which have better air quality and which encourage people to walk. Taking that approach addresses so many issues that it seems to be painfully obvious.

In Copenhagen, which is a much-cited city in this context, there are targets for the amount of time that people spend outside, which people are trying to increase annually, because being outside is a good thing. If we work on that basis, the world outside will improve in order to meet those targets and help to address the issues. A coherent approach to place making is therefore part of a broader answer to air quality issues.

12:15

Craig McLaren: I use the terms "planning" and "placemaking" interchangeably because they try to achieve the same objectives and outcomes. There is a big role for planning, but the impacts of planning are not always short term; much of the time, they are medium to longer term. Planning can arrange towns, cities and settlements in a way that minimises traffic, creates attractive areas for people that make them want to work there and provides infrastructure that allows people to walk and do other things, too.

I chair the national walking strategy delivery forum; it was an interesting move to get a planner to do that. One reason why the forum did that was to mainstream active travel in planning processes and thoughts about things such as designing buildings and greening places. In many ways, the active travel issue has been there for a long time and has always contributed to the air quality agenda, but the difference now is that a stronger link is being articulated.

The issue is being able to implement and deliver plans. Often, planners plan and other people deliver the plans, so we need to bridge that gap, whether it be with the private sector or others. We should think about the private sector's contribution to air pollution, be it from house builders, developers or whoever. It is incredibly important to bridge the implementation gap.

As I said, planning is often seen as just something that we have to get through. However, it should be seen as much more than that and as something that provides a route map to a better place—it is as simple as that. Using planning in that way will help to tackle air pollution, climate change and a host of other matters.

Emilia Hanna: Active travel has been mentioned a lot in the context of planning, and I echo the point that it is important. However, it is also important to focus on transport budgets for supporting active travel. This year, the Scottish Government will spend £150 per head on trunk roads and new motorways but £7 per head on walking and cycling infrastructure. That speaks to the reason why we have such low rates of cycling across Scotland.

In Seville in Spain, 80km of cycle lanes were created between 2007 and 2010. In that city, the modal share for cycling increased in that period from 0.5 per cent to 7 per cent, and air pollution levels were slashed in half between 2000 and 2012. Seville's levels were illegal but are now within the legal limits, in large part because of the investment in safe cycling infrastructure, which enabled behaviour change and modal shift.

We need proper scrutiny of how much of the Scottish Government's transport budget is being

allocated to active travel. I applaud the City of Edinburgh Council's efforts in investing 10 per cent of its transport budget in cycling.

Claudia Beamish: I have a broader question about planning for those who have not yet commented and those who have. How can we bridge the gap between policy on and delivery of better air quality through specific actions to bring about culture change and a more holistic approach? I appreciate that some people have commented on that, but I want to home in on the specifics for achieving a more holistic approach and culture change.

The Convener: I ask for brief answers, please.

Emilia Hanna: As a policy, we need a strong network of low-emission zones across Scotland, and not just in one city, that supports the transition for buses so that the bus sector thrives rather than suffers through such zones. We need to look at reregulating the buses so that passenger use of them increases, and we should look at Westminster's Bus Services Act 2017 in that regard.

We need to invest more in cycling, ensure that 20mph zones are the default in urban settings and enable councils to introduce workplace parking levies.

In relation to planning, Scottish planning policy is slightly weak on air quality and says only that it should be considered. That needs to be strengthened as part of the planning review.

Vincent McInally: There has been a huge improvement in and recognition of the work that planning can do on air quality. I do not want to infuriate any planners who might be present by mentioning this, but my city of Glasgow has moved from thinking that putting a motorway through the city centre was a good idea to putting in place the avenues project, which seeks to create avenues that promote sustainable travel—cycling, walking and public transport—at the expense of cars.

In relation to planning, I highlight the issue of wood burning and biomass. That has been promoted as a greener alternative, but there also seems to have been a move towards promoting biomass in areas where it is not suitable. The biggest improvement in air quality in the UK can be attributed to the banning of the burning of coal and solid fuels, but we might be undoing some of that through the promotion of wood burning and biomass in certain areas.

The Convener: Can you quantify the scale of the problem? We tried to get a handle on it earlier.

Vincent McInally: All that we know is that the problem is growing, but it is difficult to quantify it exactly. In London, increases in particulates have certainly been noticed on cold nights outwith times of peak traffic movement. The problem here is not the same as it is in London, but it could get worse, and we do not have good enough controls.

I briefly mention the need for further investment in cycling and walking, as that is the long-term answer to pollution in our urban areas. Moreover, I note that we in the local authority can do a lot of work on air quality because of the ring-fenced grants that we get from the Scottish Government, and I simply make the point that that money is appreciated and that we would like it to continue over the longer term.

Craig McLaren: I will mention three things. As the committee might know, the planning system is being reviewed, and we have been talking about key principles for the planning system that would help with the agenda.

First, the process should be much more front loaded. Much earlier in the process, we should have discussions with communities and stakeholders and decide what we want to do and who is responsible for what, because that will give us a clearer idea of and route map for where we want to go.

The second point is about where planning fits into the corporate agenda in the public sector. Planning had been sidelined and was seen as something that was regulatory; although that aspect is important, we need to do much more to recognise the benefits of great places and place making and of planning as a preventative discipline that can make things better.

Finally, we need to be much more collaborative. Places are affected by a lot of things that planning has no control over or cannot link into, and we need to ensure that such matters are thought about in, for example, the review of the national transport strategy. We also need to think about how city region deals, which are the main way of funding infrastructure now, fit into and connect with all this, and we need to look at the many other disciplines, strategies and objectives that influence the issue.

Professor Rye: To come back to Claudia Beamish's question about how we can encourage an integrated approach, we have heard a lot about what might be called the imbalance of funding—about funding being put into things that do not really encourage the improvement of air quality. Funding should be shifted to walking, cycling and public transport, and there should be a more integrated approach to air quality management, but if we were to build into that some conditionality to ensure that people worked in a cross-sectoral way, that could stimulate the integrated approach that you seek.

The Convener: I thank all our witnesses very much for their contributions to both evidence sessions.

The committee will next meet on 16 May. As agreed earlier, we now move into private session, so I ask for the public gallery to be cleared.

12:24

Meeting continued in private until 12:57.

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