

Environmental Audit Committee

Oral evidence: Air Pollution in England, HC 1656

Wednesday 22 April 2026

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Members present: Mr Toby Perkins (Chair); Julia Buckley; Jonathan Davies; Carla Denyer; Barry Gardiner; Sarah Gibson; Chris Hinchliff; Manuela Perteghella; Martin Rhodes; Dr Roz Savage; Sammy Wilson.

Questions 97 - 126

Witnesses

[II](#): Professor Mark Sutton, Environmental Physicist, UK Centre for Ecology and Hydrology; and Ms Jenny Hawley, Policy and Advocacy Manager, Plantlife.

Written evidence from witnesses:

- Written evidence from Plantlife ([AIR0138](#))

Examination of witnesses

Witnesses: Professor Mark Sutton and Ms Jenny Hawley.

Q97 **Chair:** Welcome back, everyone, to our second panel on the subject of air quality. I am delighted to be joined by Professor Mark Sutton and Ms Hawley. Please introduce yourselves and your area of expertise and knowledge in this area, starting with Professor Sutton.

Professor Sutton: I am Professor Mark Sutton from the United Kingdom Centre for Ecology and Hydrology. Once upon a time I was a botanist, then I was an environmental physicist and then I followed ammonia and nitrogen wherever they went, so one ends up being rather interactive through these things.

Ms Hawley: I am Jenny Hawley. I am the Policy and Advocacy Manager at Plantlife International, which is a global charity working to enhance, protect and restore wild plants and fungi. Our scope includes vascular plants, which are flowering plants, bryophytes, lichens and fungi. I have been working on air pollution impacts on biodiversity with Mark for about the last 10 years. I am also a member of the Sustainable Nitrogen Alliance, which Plantlife was a founding member of, so I will be talking about some of the alliance's work today as well. That is a group of organisations that have come together to work towards a strategic and more joined-up approach to nitrogen pollution in all its forms, so air pollution, but also water and greenhouse gas emissions and the impacts they have on biodiversity, public health and climate change.

Q98 **Chair:** Ms Hawley, on that subject, how do nitrogen dioxide and other oxides of nitrogen affect plants in the ecosystems they exist within?

Ms Hawley: Airborne nitrogen pollution is one of the main drivers of the loss of wild plants, lichens and fungi, which then has a knock-on effect and leads to the loss of pollinators and other biodiversity and the degradation of ecosystems. Those impacts are felt through acidification and eutrophication. In a way it is quite similar to the pollution of our rivers, which we hear a lot about. It is potentially less visible and less well known than that impact, but essentially makes the habitats unsuitable for those species to survive.

Many of our wild plants, lichens and fungi just cannot tolerate the high levels of nitrogen that are deposited from the air on to vegetation. Lichens, for example, have no roots so they take all their nutrients—their water and everything they need—from the air, so they are particularly vulnerable to air pollution. Of course those species are the foundations of the ecosystem and they are quite overlooked. There is quite a specialist group of people who get into lichens, mosses and fungi, but they are absolutely the cornerstone of all biodiversity and ecosystems. The impacts, like I say, can be less visible, but equally dramatic in the long term and can have direct toxic effects. Mark is much better placed to talk about the science behind this.



I was talking to colleagues recently who work out in the field. They see the change in species composition in, for example, our temperate rainforests or in our grasslands, peatlands or moorlands. The plants that make up those habitats are changing from the species that should be there in a healthy habitat and healthy ecosystem. Because they cannot survive those high nitrogen levels, they are being overtaken by more nitrogen-loving species, which tend to be a bit more aggressive and dominant, so you see grasses growing in moorland, for example. It is changing the nature of that habitat and you are losing the habitat.

It can be quite a gradual process of decline and change to something different, which is less obvious to the untrained eye, but is having quite a dramatic effect. If we lose all those plants, lichen and fungi species, then we potentially lose the pollinators and the other invertebrates and the other biodiversity that depend on them.

Q99 Chair: I want to expand on that, so talk us through what the real-world impacts of the loss of these species would be. You touched on it at the end in terms of pollinators and others. To what extent is this just an agricultural problem? What are the other real-world impacts of the species loss that you have just described there?

Ms Hawley: It is certainly not just an agricultural problem. The agricultural problem is that a lot of the pollution that we are concerned about is coming from agriculture. We can maybe come on to that in terms of the sources and what can be done about it. There are quite stark figures published on behalf of the Government. Of all the nitrogen-sensitive habitat area across England, which is most of what you think of as natural areas—our woodlands, meadows, moorlands and so on—99% have exceeded the critical loads for nutrient nitrogen, which means essentially they have more nitrogen than the species can tolerate.

It is basically all those habitat areas, and over 97% of our most important wildlife sites, the sites of special scientific interest, have also exceeded those critical loads. It is a very pervasive problem and much less visible, potentially. Listening to the previous witnesses, our public health and environmental health are so closely interlinked and interconnected. If we lose this biodiversity and the ecosystems that we all depend on for clean air, clean water, a liveable climate and our food and so on, then that has a huge impact on us all.

Q100 Chair: Are you referring there to the agricultural cause of some of these issues? Is it the case that effectively the fertilisers that are being used within agriculture with a view to protect and enhance our food security are undermining that food security because of their impact on species? Can you give us a sense of the complexity of nitrogen within the agricultural sector and the impacts that it ends up having?

Ms Hawley: Nitrogen is a basic fertiliser that all farmers will be looking for and that can come from different sources, whether it is synthetic fertilisers that are brought in or organic manures from livestock or



HOUSE OF COMMONS

nitrogen-fixing plants such as legumes. All farmers need nitrogen on their farm and it is naturally occurring, but the problem is that we have this excess nitrogen. Ammonia is a particular issue of concern from agriculture and 84% of England's ammonia emissions come from agriculture.

Compared with all other air pollutants, that has hardly declined in the last 20 years. Total ammonia emissions in England have decreased by only 8% since 2005 up to 2023, but if you look at the agricultural components of those ammonia emissions, the agricultural ammonia emissions have declined by only less than 5%. If you compare that with all other major pollutants, which have declined between 39% and 88% in that same period, the lack of focus is quite stark.

Q101 **Chair:** What is the reason it is so far behind?

Ms Hawley: There are a lot of reasons for that. The way that ammonia is emitted from farming is embedded in the practices that farmers use. We need to shift farmers to different practices, so different ways of storing, managing and applying fertilisers and manures to their farms. We have also seen an increase in intensive livestock units, so more concentration of farm animals, which again creates more manure than the land can hold. We are going beyond the carrying capacity of the land.

That is an issue not just for air pollution, but for water pollution and greenhouse gases. We have ammonia in terms of the air pollution; the nitrate pollution that goes into our rivers, which is well known; and nitrous oxide, which is a very potent and long-lived greenhouse gas that is also mainly from agricultural sources. These all have impacts on public health as well as on biodiversity and our climate.

There is this total perfect storm of different forms of nitrogen, which are constantly fluxing between different chemical forms. Mark is the expert on those. We are advocating a much more integrated approach to tackling those emissions, particularly from agriculture. For example, you have the farming rules for water, which farmers are legally required to comply with, but there is almost no regulation of ammonia emissions. If you had farming rules for nutrient management and nitrogen as a whole, you could achieve many different benefits for public health, biodiversity and the climate. That is just from small adjustments and taking a more joined-up approach to farm regulation so that it cuts across these different impacts and does not just focus on water pollution.

Q102 **Chair:** Professor Sutton, how can a balance be struck between enriching soils for crop production and protecting the environment?

Professor Sutton: It is about getting the nutrients, the nitrogen in particular, in the right place. When you put nitrogen fertiliser on, if you put it on as urea, a fraction will come off to the air as ammonia emissions and then go through the air and land on the natural ecosystems. It is the



same with manures—manures are very volatile—so getting ammonia up into the air means it is going where we do not want it.

Of course proteins are carbohydrates with nitrogen. We need nitrogen compounds in our food. It contributes to our food security, and we are not going to live without it, so whether we supply our crops through fertilisers or through a biological nitrogen fixation, which means using legumes, peas and things, to provide the nitrogen we need, or whether it is through recovery of existing nitrogen sources such as in manures or sewage, we want to look towards a more circular system with less losses to the air. In the joined-up approach that Jenny mentions, we would like less losses to air, less losses to water and less losses back to dinitrogen.

About 78% of the air that we breathe is N_2 . It is unreactive and does nothing, but in making fertilisers we convert some of that N_2 into ammonia, NH_3 , or nitrates, nitrogen with oxygen. The process called denitrification is the converting it back from useful nitroforms to atmospheric nitrogen. That is happening all the time. Microbes are doing it. If you go into a waste water system, that is often deliberately done to remove pollution.

I would say let us think differently. Let us think about it as a resource in the right place—a waste water treatment system that aims not to destroy the nitrogen resource, but to recover it in a circular system. It is the same with the manures in the field. Whether it is losses to air or losses to water, a joined-up system would try to get the win-win with all of them having it in the right place.

I would like to add a bit of supplementary answer into Jenny's earlier answers about the different nitrogen forms. It is emitted primarily as gases, and once it is in the air it may get formed into particulate matter. One of the points that Roy Harrison alluded to was that the particle levels are often very high in rural areas as well as urban areas. One of the reasons for that is it is coming from ammonia emissions from farming as well as nitrogen oxide emissions from long-transported pollution to produce a PM in the rural environment even before it gets to the urban area. Once it comes out of the atmosphere it may fall out through rain or it may fall out as the gas is depositing. That is why we make this distinction between so-called critical loads, which are the thresholds of deposition with effects on ecosystems, and the critical levels, which are the so-called thresholds for direct toxic effects of air pollution.

When it comes to ammonia and NO_x , they both play a key role on both sides. In terms of the air quality changing, the big success story has been the reduction of sulphur dioxide emissions, particularly from coal burning. It was amazing for me to listen to the first panel and not hear coal mentioned every three seconds. It was rather absent. Of course that is something to celebrate—there is a lot less of that—but with less sulphur dioxide and indeed with less nitrous oxides that means that the ammonia in the air stays up there for longer.



HOUSE OF COMMONS

There have been some actions to reduce ammonia emissions, for example, from pig farming and some from poultry farming. We see that in the long-term monitoring network that is supported by DEFRA. We do see an increase in ammonia air concentrations in the remote areas. Essentially what is happening there is that with less of those acids in the atmosphere, the ammonia lasts longer in the atmosphere, increasing the concentrations.

There is one last point on this, which is the impact. You can think of nitrogen as a nutrient—of course that is why we use it as a fertiliser—but if you fertilise a forest, the ecosystem balance changes and species change. You can also see them as toxic pollutants, with these critical level exceedances. Ammonia is an alkali and one of the things we think is happening with ammonia is not just a nitrogen effect, but an alkaline effect. As we have reduced the NO_x emissions and the sulphur emissions, the air in Britain has overall become less acidic and more alkaline. If you are, for example, a peat bog system, which is naturally acidic, that means you are particularly vulnerable to the ammonia. In terms of impacts on ecosystems, I would say it is ammonia first, NO_x second.

Lastly, I am going to come back to food security, which we might discuss a bit more later. The ozone—the tropospheric ozone; the ozone in the air we breathe—is in a sense an honorary nitrogen compound because it is formed by a mixture of nitrogen oxides and volatile organic compounds. Of course most of the NO_x is coming from transport, although some comes from fertilised agricultural soils. That ozone is leading to a reduction in crop growth in our agricultural systems, so a depression of yield, making that a threat to food security.

Q103 Carla Denyer: Do you think that the current national measures and regulations are enough to tackle nitrogen pollution or are more targeted or localised approaches needed? Jenny, you have already told us that you think we need more specific measures for farm practices, but are there any other changes that you would want to make to the Government's approach to reduce nitrogen air pollution?

Ms Hawley: As I said, this does need a much more joined-up approach and more systems thinking. The nitrogen cycle is a whole system, as Mark has talked about. It does cut across then to public health issues as well. As Mark was saying, the ammonia contributes to particulate matter formation with those impacts on public health. What we need to see, and particularly from this Committee, is an approach to nitrogen across Government Departments. At the moment I think the ammonia issue is very much within DEFRA, but if we had the Department of Health and Social Care banging on DEFRA's door demanding regulation of ammonia for public health reasons, we would see much faster action to get those emissions down.

We were talking about planning earlier. There are issues for MHCLG as well. The planning system is absolutely fundamental to managing the farm developments and the agricultural developments, where there is a



HOUSE OF COMMONS

big issue particularly around the intensive livestock units. There was evidence published by Sustain and Compassion in World Farming recently showing ammonia hotspots around the country, particularly in the border counties with Wales, north-east England and East Anglia. We need to see cumulative impact assessments from local authorities so that when they get a planning application for an intensive chicken shed, for example, they do not just look at that one in isolation, but look at what other units already exist in that area, "If we add another one, what's the cumulative effect of that cluster of units together?"

More broadly, nitrogen dioxide is also a contributor to the loss of biodiversity. It is not just about ammonia but about the NO_x emissions as well. There needs to be a much more holistic approach, looking at air pollution across the board. There is also an issue around ozone. We have the ground ozone that I think was mentioned earlier, but also the stratospheric ozone, to which nitrous oxide is now globally the main contributor. As I understand it, when we talked about saving the ozone layer years ago, that was concentrated in the north and south poles, but the way that nitrous oxide depletes the ozone layer occurs at cross-latitudes, so it means that the ozone layer is thinning where people live, which increases the risk of UV radiation and skin cancer. Again, these things are all deeply interconnected in this nitrogen cycle and the action that is needed across Government and across different sectors.

Q104 Carla Denyer: Do you have anything to add, Professor Sutton? On this Committee we are always keen for specific recommendations, if you have them.

Professor Sutton: Let us just start with some of the numbers. I want to put England in the context of the UK. Some numbers I have pulled out of critical load exceedance at a UK level: 59% in 2017, which is going down with the actions up to 2030 to 50%, which is a 9% improvement. It is not much. That is the UK. As Jenny said, England is up at 97%, with an improvement down to 90% exceeded. Scotland is of course much better. The highlands are rather big and rather clean, so there it is 34% down to 24%. The two things to see there are, first, that England is particularly bad because it is so agricultural and because there are so many transport sources compared with other parts of the UK, so those percentage improvements are rather modest. Secondly, those are percentage improvements in the level of exceedance of the thresholds.

Compared with other emissions reductions and NO_x reductions, where there has been a 60% or 70% reduction over the last 20 years, the ammonia reductions have been extremely modest and remain modest up to 2030. Let us say we have 15% or 20% ammonia emissions reduction, but that is tiny compared with what other countries have achieved. The leader of this is the Netherlands, which between 1997 and let us say 2015 achieved a halving of ammonia emissions. Since then, given its nitrogen crisis, as it calls it—and we can come back to what has driven



the nitrogen crisis—it is looking to halve it again up to 2030. That is serious action.

This finally comes to your point about what measures would make a difference. First off, the biggest source is liquid and solid manure, which comes out of the back of the animals, then animal houses, manure storage and manure spreading. In terms of the measures, I would work in reverse order. Start with measures in the field with low-emission manure spreading techniques, whether that is a trailing hose or a trailing shoe or an injection or acidification—a whole menu of options. Those have been required for 20 or 30 years in the Netherlands and we have not required them yet in the UK. We are really behind. Why start with the field? Because that is where the farmer can immediately see the benefit, because if he is losing less to the air more is staying in his crop and he does not need so much fertiliser. If you do it right, it is a profit opportunity for the farmer.

The second thing would be, going back to the manure store, to store it well. That is good manure and it just means putting a lid on it—this is not rocket science. Store it well, put it on the field well, get the most out of it for the farmer and of course reduce emissions to air.

When it comes to the animal houses, there are some low-hanging fruit, but this is where some measures can get more expensive. That is where you might be doing it just because of the environmental imperative, but the farmer might not make money out of it; it might cost them. That is the juggle of the environment versus productivity. My key message is that with manure spreading, manure storage and low-emission fertilisers there is an opportunity there simultaneously for the farmer and for the environment.

Ms Hawley: On some of the specific measures, as I said before, the regulation is key here, particularly in terms of agriculture. We have seen a whole raft of voluntary measures, advice and capital grants and so on for farmers, which are all well and good and necessary, but have not been sufficient to reduce the ammonia emissions. I did a little comparison with the clean air strategy from 2019; it is now seven years since that was published. There were some very strong commitments in there to regulate the kinds of things that Mark was talking about: covering slurry stores, requiring low-emissions spreading and extending the environmental permitting system for intensive livestock units. There were some key measures and very few of those were delivered by the previous Government.

Now the environmental improvement plan has just been published by this current Government in December. Again, it goes back to a much more voluntary approach, unfortunately, and talks about some streamlined regulation or new regulation if necessary. In terms of specific recommendations from this Committee, it should be pushing forward on regulatory measures to tackle this problem. We need to take nitrogen



pollution as seriously as we take carbon emissions and we need to take air pollution as seriously as we take river pollution. It needs to be much higher up the agenda—much more visible with much more concerted action.

There are a lot of opportunities coming through for that in terms of the current policy agenda. There is the circular economy strategy and we are encouraged to see a commitment to tackle nutrient circularity within that process. That is a big opportunity. There is the national food strategy, the 25-year road map for farming, and some of the changes to planning policy. Somebody mentioned potentially a new Clean Air Act, or at least a new clean air strategy.

There are lots of opportunities there, and that is the key thing: for the Government to see this as an opportunity. If you take this joined-up approach across public health and the environment—across air, water, climate and soils—there are massive gains to be had in the efficiency and effectiveness of actions to meet the Government's targets for public health, net zero, biodiversity, clean air and clean water. It is an opportunity. It just makes sense to do it this way, rather than keeping all these different policy issues in silos.

Q105 Carla Denyer: Presumably with the food strategy there is also an opportunity to incentivise more sustainable farming, which would mean fewer of those intensive livestock units.

Ms Hawley: Yes, and that transformation to more regenerative farming is absolutely key. The nutrient management expert group, which reports to DEFRA, published a report a couple of years ago on just this issue. It said that the greenhouse gas emissions reductions needed from agriculture to approach net zero “cannot be achieved without...rethinking land use patterns and practices”. We need that kind of transformation. The land use framework, which was published recently, does make a commitment to have multifunctionality as one of its principles, which was good to see, but you cannot have multifunctional land use while these ecosystems and our agricultural land are so saturated with nitrogen.

Grasslands are a good example, particularly chalk grasslands, which are the most diverse, species-rich grasslands. You can find up to 40 species of wild plants in a square metre. They are exceptionally diverse. Again, it is less visible than our ancient forests but just as important, and the UK has an international responsibility for that habitat. It is only found in north-west Europe. The UK and Salisbury plain, where I live, is a large part of our global resource of that habitat. It is exceptionally important.

You cannot have multifunctional chalk grasslands with nitrogen levels that high. If you do reduce the nitrogen levels and restore the biodiversity, that has widespread benefits for air quality, water quality, climate and greenhouse gas emissions—all the things that we are talking about—and it is still productive farmland as well. You will still have



livestock on those grasslands and they can still be actively farmed, but at a much more sustainable and regenerative level.

Q106 **Carla Denyer:** Finally from me—I think I know what your answer is going to be, but I am going to ask it to get it on the record—in a word, if you can, is the UK on track to meet its 73% reduction in oxides of nitrogen by 2030?

Professor Sutton: I have to say I do not know the answer to that. I see that lots of assessment is done on the quantification of those emissions. We had in the previous panel the question of whether the emissions are what they are said to be in the emissions inventory. As far as I can see, they are, but I would not say I am sufficiently expert on that.

Conversely, on the ammonia one, have we taken action? We have not taken many actions. It has been said in many of the meetings in Geneva that I went to on the convention on long-range transboundary air pollution, which is revising the Gothenburg protocol, that ammonia is difficult to control. I would say that is not true. Ammonia is very easy to control, but you have to agree to take the actions.

Chair: Thank you very much. I am very grateful for the depth of these answers but I am also quite conscious that we will be getting votes again, so if we can ask you to be as concise as possible in regard to the questions we are specifically asking here. Thank you.

Q107 **Jonathan Davies:** Thank you for all the information that you have provided. You have articulated something that the public probably do not see. They see air pollution as being an urban problem, but it is a huge problem in rural areas too. Just leaning into that, you talked a little bit about how ammonia is 84% of those emissions from agriculture and it has been a stubborn figure for a very long time. There appears to be some contradictory evidence, however, on whether digestate spreading contributes to increased ammonia emissions. Do you accept there is a variety of views? Are you best placed, Professor Sutton, to respond?

Professor Sutton: Yes, I am happy to take that one. We are doing more anaerobic digestion now. When you digest organic materials, you make a thin liquor. It is thinner so it will infiltrate better into the soil, but it tends to have a higher pH. That will tend to increase ammonia emissions. If we do more of it, we will get more ammonia emissions from that source.

Q108 **Jonathan Davies:** We are moving to this mandatory food waste recycling and a lot of that will go into anaerobic digestion. Should we expect to see that increase then?

Professor Sutton: Yes, that source will increase. That is the starting position. However, in the bigger picture, anaerobic digestion is a great enabler because with a thinner liquid it is easier to use the low-emission spreading techniques that we talked about earlier: injection, trailing hose, and trailing shoe. The way to look at anaerobic digestion is that if you just do more of it but do nothing, emissions will go up, but if you do more



HOUSE OF COMMONS

of it and manage it well, your emissions can go down. A combined package of anaerobic digestion with low-emission spreading techniques is an opportunity to reuse or recycle your nitrogen better.

Q109 Jonathan Davies: Do you think farmers and the agricultural community would welcome the opportunity to do more of that? Did you say it is thinner?

Professor Sutton: Yes, it is thinner. If you are spreading manure and you stick it out through one of those old muck spreaders, you do not need a narrow nozzle. However, if you want to spread it out in nice, neat rows—precision spreading—and it is thick, gloopy slurry, it may block your system, which is very frustrating for farmers. If you are spreading a thin liquid out of an anaerobic digester, it is much easier to use low-emission spreading equipment.

That is also why some of our colleagues are talking about active separating of solids and liquids of manure on farms. This is being discussed in Northern Ireland. A contractor will come in, separate the solids and liquids from a cattle farmer's manure store, give the farmer back thin slurry, take away the solid material and use it in anaerobic digestion. For the farmer that is a benefit, because it means he can spread his manure more easily through low-emission techniques.

Q110 Jonathan Davies: Is there an additional cost to the farmer with the low-emission technique?

Professor Sutton: I would say there is an additional cost but there are also additional benefits. This is where, to make it a good business model, you need to invest and do any business right. You have the cost of the low-emission spreading equipment, which would be more. You have a bolt-on bit of kit to go on the back of your spreader. The gain, conversely, is that you can then work out, "I don't need to buy so much fertiliser," and reduce your fertiliser expenditure. Of course that also means increased resilience against fertiliser price shocks. As we know at the moment, with the Iran war, we are up to double the previous fertiliser price. We went up to triple during the Ukraine war. As a business model, if you do it well, there is a profit opportunity in the balance of that. You can be looking at a percentage return of capital investment and how many years it will be until that investment will pay back for you.

Q111 Jonathan Davies: At the moment we are somewhat dependent on voluntary measures to reduce ammonia emissions through fertiliser use. If we created the climate where more farmers were minded to adopt the approach that you have described, do you think they would buy in?

Professor Sutton: This is an ambition question for Parliament. How far do you want to go? How quickly and how much do you want to reduce emissions? Voluntary approaches may sound nice, but when it comes to, for example, the one you just mentioned on urea—an agreement with the Red Tractor initiative on voluntary use of urease inhibitors or incorporation if using urea in the summer months—how much has that



HOUSE OF COMMONS

delivered? I think some assessment is needed of how much uptake there has been of that.

Conversely, if you want to reduce emissions, this is what the Dutch and the Danish and the Germans have done. The Germans brought in their Düngeverordnung in 2017, which said it will be the case that all urea fertilisers have an inhibitor or are incorporated. It is a question of ambition. If you want to reduce emissions substantively, the countries that have made progress have done it by mandatory requirements.

Q112 Chair: Some people might say it is very easy for us to sit here and say that the Government have to be more ambitious on behalf of farmers. Farmers are already very much stretched. There is huge pressure on farming incomes, farming livelihoods and food security as a result of that need to take on substantial additional costs now and hopefully benefit down the line. I imagine that there will be huge opposition to the mandatory approach. Is it easy for us here in the capital city to say that farmers have to be more ambitious when in reality they are facing huge financial pressures?

Professor Sutton: If I take that first and then come to you, Jenny, it is a question of working with, not in opposition, and finding the points of alignment first. Farmers will be complaining about the increase in fertiliser prices at the moment, quite rightly. What we are saying is that using these low-emission techniques, losing less to the soil and less to the air, and working towards improving nitrogen use efficiency is a good thing for the farm. That is going to improve your resilience.

Let us acknowledge that there may be capital costs involved. How do we work with them? Of course £3 billion a year across the UK is spent on agricultural subsidy. However, if you look at the magnitude of the subsidies that were associated with capital investment for low-emission manure spreading, it was a few million. This was a trivial allocation of resources.

I would say that if we add up the amount of nitrogen wasted to air, land and water—if we do it for the UK in 2023—and multiply it by the fertiliser price, we get about £3 billion, so about the same number as the total cost of agricultural policy subsidies. That seems to me, first, to be a rather scary number, and secondly, to be a good argument for saying, “Let’s work with the farmers and look towards restructuring the subsidy system so that it can help farmers to deliver that higher level of ambition, so that their business is still as good as it can be and the investment is there.”

It is worth thinking about that. If the Government subsidised the investment in capital expenditure, the farmer is taking all of the profit from those reduced emissions and savings. In the long term it is good for them, but of course we must be working together to get there.

Chair: Do you want to add anything on that, Ms Hawley?



Ms Hawley: There are existing options through the environmental land management schemes and the capital grants scheme, like Mark said, and that needs to be a package. We are not saying, "Just regulate, ban stuff and require farmers to do things." Make it a package where you have the advice, the support, the grants and the financial incentives.

I would add that there is good evidence that if farmers move to a more regenerative farming system and are less reliant on external inputs like the fertilisers that are brought in, it makes the farm more resilient. You are not exposed to the price volatility that we are seeing at the moment, but also the whole farm is more resilient to climate change, different environmental shocks and the extreme weather that we are experiencing now. If you implement that package of measures on the farm and reduce the amount of nitrogen wasted, you can increase yields and you can increase income on farms. There is some good evidence of that, which I can submit to the Committee afterwards. It is not all about a cost to farmers.

Q113 **Sammy Wilson:** You have dealt with some of the points I wanted to make but I may probe them a bit more. First of all, Professor Sutton, the current target to reduce ammonia emissions by 2030 is 16%. Given what you have said about the impact of ammonia on habitats and so on, do you think that target is sufficient?

Professor Sutton: I think it is clear that the target is not sufficient if we want to avoid adverse effects. I frame this as a scientist, of course. Those numbers I just gave you—and Northern Ireland is even worse than the UK—show a high level of exceedance. We are making a dent and it is good that it is going in the right direction, but much more will need to be done if we are going to avoid those adverse effects.

Following up on the last point, I would argue that it is, in the long term, good for farming to go for a precision system where we are managing nitrogen better and we do not just see the ammonia on its own but as one of those nitrogen losses. I would like to see systems with improved efficiency where we are wasting less to nitrous oxide in the climate, wasting less to dinitrogen—which is just a waste of the nitrogen resource—wasting less as ammonia and less to nitrate, so that ultimately that can reduce the impacts on ecosystems, air quality, water quality and climate at the same time.

Q114 **Sammy Wilson:** You say that probably it is not adequate, but do you think we are even going to meet the target that has been set?

Professor Sutton: I have to say I find it hard to answer the question that Carla Denyer raised earlier about the NO_x, and the same applies with the ammonia. I am sure that with some modelling one can say that one might be on track, but that would need to have some assumptions in it. One assumption would be about the use of urea with the voluntary scheme and how much one assumes that voluntary scheme is implemented. I cannot answer that question.



HOUSE OF COMMONS

Ms Hawley: Ammonia emissions in England increased by 1% between 2022 and 2023. Those are the latest figures that we have. I find it very hard to see how we are going to meet that 2030 target. I would add that the UK Government have signed up to a much more ambitious target at a global level through the global biodiversity framework. Target 7 is to halve nutrient losses to the environment by 2030. That is an ambitious target. We are not going to meet that either, but again that is a target that we have signed up to.

One issue for ammonia is that it is not covered within the World Health Organisation guidelines. If the Committee is looking at that as a standard for targets, it does not cover ammonia. I would urge you to make sure that ammonia is covered separately, beyond those WHO guidelines, and also to think about what comes after 2030. It is less than four years now until 2030. Those targets are coming up on us quite rapidly and it looks like we are not going to meet them, so we need to think about that longer term as well. What comes after that? What is the target for 2040 and beyond? That will come up on us quite quickly.

Again, there is this holistic approach. If we can take more concerted action towards that 16% target, it will also help to meet the Government's other targets on biodiversity from the Environment Act, water quality, PM_{2.5} and net zero. There are a raft of benefits to the Government to going all out to meet these targets, because if you do it in a joined-up way, you are not just going to meet the ammonia target but you will meet all these other targets as well.

Q115 **Sammy Wilson:** We talked in the earlier panel about the conflicts between the various pieces of advice that the Government gets. For example, we talked about diesel cars. On one hand, experts were saying, "Yes, you should drive diesel cars." Later on we found out that air pollution from those cars has been much more impactful than, say, petrol cars. It is the same with wood burning stoves and so on. Are we not in the same situation here? As the Chair said, we produce only about 60% of our own food. Food security is becoming increasingly important and one of the sources is to produce your own food, yet we are putting all these pressures on the land with wind farms, wildlife areas, more forestation and so on. We are more likely to have intensive agriculture. Is the impact not likely to be that we will have increases in ammonia, despite all of these things? In Northern Ireland we have gone for lesser emissions, better housing, better manure storage, better scraping systems and so on, yet we find that ammonia emissions have not been greatly impacted by that.

Furthermore, the transition is not as easy as you have described, Professor, because farmers have to—*[Interruption.]*

Chair: I am sorry; I will have to ask you to hold your answer there. You will have a few minutes to prepare it because I am afraid we need to go and vote again. I am going to bring this session to a halt temporarily and I am looking forward to the quality of your answer.



HOUSE OF COMMONS

Sitting suspended for a Division in the House.

On resuming—

Chair: We were cut off in our prime there, but we were about to hear what will now be a wonderfully well-rehearsed response to the question of my colleague, Sammy Wilson, particularly around the impact on food security and the pressures on farmers. Can I invite you to respond to that, please?

Professor Sutton: I will make a start. First is a plea for more time—you only gave us 10 minutes! No, it is a plea for more time for farmers. Let us look at that on two timescales. The first is that we have had a doubling of fertiliser prices this spring, which is a challenge for farmers in the immediate term. How can we respond to that quickly? It is hard to suddenly magic up the answers through a joined-up approach in one spring.

Conversely, then, let us think about a programme of restructured agricultural support that allocates more funding to, for example, capital expenditure on the kit that is needed to reduce emissions, so that over the next year or two farmers are getting used to that. I know one farmer who got himself a low-emission manure spreader and slurry bags in the 2008-09 spike. Fifteen or whatever years later, he is very happy with it. It then takes time.

On that longer timescale, let us imagine that in the next two or three years—that is quite fast, I think—farmers are getting the support for getting those systems in, getting used to them, discussing among themselves how to improve them and so on. That means that in five years' time when the next crisis comes, they are going to be more resilient.

On the specific point about Northern Ireland, I have conversations with colleagues in DAERA and I find it quite hard to follow exactly where they are at one time. It is very good that there is a lot of discussion about bringing forward these measures, but it is not clear to me how much uptake they have had so far. That may be again something we need more time to follow up with. However, it is great to see the initiative being taken there.

Q116 **Sammy Wilson:** First of all, decisions have to be made now, for example, with planning applications, and the capital restructuring that is required sometimes does require new sheds to be built or whatever. But if you are saying that we have to reduce ammonia emissions, that the targets we have set are not high enough and that they are not even going to be met, of course the pressure will be on to say, "Don't give any more permissions." I am sure it will be the same in England, not just Northern Ireland. Every planning application—even if it improves animal welfare, improves health and safety, and improves efficiency—will not be granted because we set targets now and we expect them to be met now,



even though there is a long transition period.

What is your view? You talked about ammonia emissions and the need to reduce them. I don't think anybody is debating that, but at the same time, immediate actions have to be taken in the light of an industry that has to continue to produce food.

Professor Sutton: Yes. Fast actions include soil testing. Some farmers will know exactly what they have in their soil situation; other farmers will not. It is something that can be done quickly that can inform your next fertiliser decision. I am thinking of an international example here, Sri Lanka, where they reckon that farmers are often using double the recommended fertiliser dose. I hope it is not as bad as that in the UK and that we are much closer, but it is at least something that can be done fast.

The investment, as you rightly say, does take longer. You are not suddenly going to go out and buy a piece of kit. You have to save up for it. One of the other challenges worth thinking about is that when investing in capital expenditure, a farmer has a multifunctional world. He is going to say, "I'm thinking of spending. What am I going to be buying?" It might be something to do with better energy management; it might be anything to do with the farm. How high up the agenda of his capital spend does manure management feature? It may not be at the top of his list and he is going to buy something else first.

The only solution I have is back to the long-term planning and being much more serious about capital investment as part of agricultural policy, with much bigger numbers. That is going to make it much more attractive to the farmer in the medium term. Quite rightly, that is not going to solve a crisis this spring. At least what the crisis this spring is doing is raising awareness that these are measures that we all need to be working on, both for more resilient farming and better food security and for the environment at the same time. If it gets people around the table and taking action seriously, it is helping.

Q117 **Julia Buckley:** You have given a lot of detail there specifically about agriculture and how other sustainable practices could have a knock-on effect in the long run on air pollution. Do you think current strategies around air pollution consider adequately not just agricultural emissions, but other rural emissions, or do you feel that they are overly urban-centric?

Professor Sutton: I think it is clear that they are overly urban-centric. We see this in the international discussions as well. Even on this panel, we have air quality and health first and we have the ecosystem second. That is just an illustration. It is across the board. I am not denying the importance of human health—of course that is key—but remember one of the points that Roy Harrison made, that particulate matter levels are high in rural areas as well because of the agricultural emissions, because of



HOUSE OF COMMONS

the nitrogen oxide emissions, so there is a case for more action in rural areas.

When it comes to the regulations, as Jenny has outlined, there are very few statutory limits for the protection of ecosystems. These critical loads or critical levels are not set as a statutory, binding target in any way. Ammonia emissions—which is the rural pollutant, of course—do not have much beyond the national emission ceiling.

Of course we are out of Europe now, but we are still part of the United Nations air convention, the convention on long-range transboundary air pollution. That is renegotiating at the moment for a third round of the Gothenburg protocol and the next meeting is next month in Geneva. I will be there. We have several papers on the table to support the negotiations. Those include, first, pitching the case for low-hanging fruit, by which I mean the easy, cost-effective measures for ammonia mitigation, and distinguishing those from the expensive measures. These are things that you can just get on and do: put a lid on your manure tank or cover it in some way; use low-emission spreading.

Secondly, there are options for the revision of something called annex IX. It sounds a very mysterious name. The protocol contains overarching agreements. Annex II is about the emission ceilings and annex IX is mandatory measures on ammonia emissions. Those were drafted under UK lead in the 1990s. Ian Davidson from the then Ministry of Agriculture was the civil servant leading on that. It put in place a very light, but mandatory, approach, for taking actions on ammonia emissions. Going forward, the big question in those international discussions—where of course the UK is still a key member—is whether this will be an opportunity to go further and do more or to backtrack and do less.

Ms Hawley: Can I add to that as well? There is a record of the meeting of the Gothenburg protocol from December, where the UK Government were arguing that the technical annex that Mark referred to should be classified as voluntary guidance and not mandatory requirements. According to that record, they were the only Government arguing that and the other delegations were stressing the importance of maintaining it as a formal technical annex. That is a concerning thing that we are seeing from this Government, a reluctance to regulate and an emphasis on growth and development almost at all costs.

I know this Committee, as mentioned earlier, did the report on housing development and nature. As we know, nature is not just a nice thing to have; it is not just pretty flowers and species to look at. It is essential to our wellbeing, to our future and to climate action. It is the foundation of our quality of life and our health.

On that urban-rural divide, like you say, we need to focus much more on these rural issues. I am thinking about the impacts on rural populations from these intensive livestock units. There is lots of evidence about the impacts on people's health and on their wellbeing, with things like



HOUSE OF COMMONS

odours, increased traffic and air quality. I am sure the ammonia emissions are contributing to those particulate matter levels, like Mark said. These issues are all interconnected as well: the NO_x from urban sources is impacting biodiversity in rural areas, and ammonia from rural areas is impacting urban health. It is very hard to separate these things. We need a much more holistic approach.

You were talking earlier about green space and the importance of that for health and wellbeing. Again, nature-rich green space is important. Lichens were always traditionally an indicator of air quality because they respond so clearly to levels of air pollution. That traditional canary in the mine is still there. I think it can help people's awareness of their local environment and their connection to nature as well. These interconnections are important, and we do need that more joined-up approach.

Q118 Julia Buckley: Taking you back to your first comment about the United Nations convention and the fact that the UK Government are the only one looking to make that voluntary, not mandatory, what message would you as experts send to the Government to advise them as they go into the next negotiation?

Ms Hawley: I would urge them to support the other Governments and that it should be mandatory. It is clear, and we have talked about the evidence today, that this is a serious problem. There are huge benefits economically, environmentally and in terms of health and climate to taking this issue seriously and tackling it properly. To shy away from that international consensus is, I find, quite shocking.

Julia Buckley: Professor Sutton, do you have any advice for the Government as they enter that room?

Professor Sutton: It has to be seen in a social context. This discussion we have been having with you, Chair, is about real businesses that farmers have to lead. I could imagine that DEFRA will be lobbied by farmers' unions to say, "Oh, don't touch us. Leave us alone," yet we have had that conversation for 30 years. Other countries have had those conversations, moved ahead, taken the measures needed and reduced emissions. Will that social battle between the environment and farming go on forever? Hopefully not.

What is the answer to that? I think it must be for a more constructive engagement with the farmers' unions to get frank agreement, in particular by saying, "This is what the fertiliser price crisis does at the moment. This is something we all agree that, for farming and for the environment, we need to manage better"—to make a deal between environment and the farmers. Is there any way to have a subsidised system? Take your time, it cannot be done overnight, but restructure the systems to give the farmers the support they need to make those changes and they will be the winners. They will be the ones who can tune



and trim to reduce their dependence on bought-in fertiliser in the long term.

Q119 **Julia Buckley:** Just for clarity, Professor Sutton, when you say “support”, you mean time, advice and funding to enable farmers to make this transition?

Professor Sutton: Absolutely. If £3 billion a year in cash is spent on UK agricultural subsidies, as well as all the advice, and at 2022 fertiliser prices the waste of nitrogen resource, just multiplying waste by the fertiliser price, costs £3 billion, that is a strong argument for managing the system in a way that means a win-win for farmers and the environment. Bear in mind that the externality costs on human health and on ecosystems, although hard to estimate, will be even bigger. Yes, it needs to be a restructuring to a more serious contribution to enhance the transition towards better nitrogen management, which is going to be a direct benefit for air quality.

Julia Buckley: Thank you. I think you have inspired Jenny as well to come back in and comment on this.

Ms Hawley: Yes, absolutely. I think there is that resilience on farms as well. Those farmers who have taken these steps in the past in avoiding those shocks are coping much better with the changes in price that we are seeing at the moment because of the resilience of their land and their produce.

I would also highlight that regulation is vital for providing a level playing field in any sector so that businesses are not competing against each other. It should not be that the ones taking these measures and looking for those longer-term benefits are being out-competed by the ones who are continuing to do business as usual, which is more polluting, but not seeing that. That package of support needs to include regulation, and good regulation should support businesses to become more resilient and profitable.

Q120 **Barry Gardiner:** These are words I never thought I would say, but I wish I had paid more attention in O-level chemistry. I am afraid that, in trying get to grips with this, a lot of it certainly goes over my head—and I suspect goes over the heads of people who might have tuned in at the beginning of this session.

Professor, you talked about the £3 billion saving if we just captured the waste emissions from ammonia. We tend to focus everything around us, and my colleague, Julia, was absolutely right in talking about that divide between the urban and the rural. I want to focus on the divide between us and the rest of the natural world because air pollution has a clear impact in damaging the natural world. Ms Hawley, you talked about lichens and bryophytes. Of course they are not just a canary in the mines, as you said; they actually create our soil and there is damage being done to them. I wonder if you can set out the ways in which that



damage is happening. What is the damage to the natural world? I want you to go to Luke, chapter 12, consider the lilies of the field—let's not just bring it all back to us.

Professor Sutton: I will give it a shot and I will try not to overcomplicate. Let's take a field visit to a place called Moninea bog in the west of Northern Ireland, where there was a chicken farm within a kilometre of a natural ecosystem. A natural ecosystem is a peat bog. A peat bog is full of exciting plants—I find them rather nice—the lichens, the sphagnum moss and of course the heather. In a sense, particularly the sphagnum moss is the lifeblood of a peat bog because it is what is keeping it acidic and letting the peat bog grow and store carbon. It is good for biodiversity and good for carbon storage.

There was a whole question about permissions not being sought for building a chicken farm so close. In walking across that site, I was amazed to see dead sphagnum. There was a situation within half a kilometre where most of the sphagnum was completely dead. When I went near some trees, the sheltered belt around the trees, a birch forest, was not covered with fluffy lichens, but with thick green gloopy slime. I am not quite sure how you include the sound into the written record of running my finger up the tree, but you get the message. I was as a botanist, rather excited by this. It is a bit like a surgeon looking at dead bodies; it is a professional interest.

I mentioned this to the people I was with, the nature conservation staff, about five or six people—"Isn't this amazing?" They said, "What's the problem? We see those slimy trees all the time." I said, "No, hang on, I need to explain to you—you shouldn't be seeing those slimy trees all the time." We looked at our emission map, found a clean part of Northern Ireland right over in the west, went there and showed them what healthy ecosystems look like.

Coming back to your point, I think my No. 1 response is that if the professionals do not know what they are looking for, how can members of the public know what good healthy ecosystems look like? Secondly, that was about not only the biodiversity of the site, but the functioning, because it was compromising the peat storage capacity. That little story is not the whole world, but I think it encapsulates some of what you are after—making a real difference in the natural world and being able to recognise it.

I will add one more layer into this, going from the local to the global. We are currently finalising the international nitrogen assessment, working with the United Nations Environment Programme. That means linking air quality, water quality, biodiversity, climate and all the rest of it. Among the biggest impacted sites in the world are the freshwater ecosystems as well, which is a big change. This is back to our picture of we have to learn to manage nature in a joined-up way for all these benefits.

Barry Gardiner: There is acidification, eutrophication, ground-level



HOUSE OF COMMONS

ozone, but I love that sound, because people understand it in a way that they do not understand O₃.

Professor Sutton: Yes, that is it.

Q121 **Barry Gardiner:** Tell us about pollinators and the impact on pollinators.

Professor Sutton: I am not an expert on this, so I will keep it very brief, but there has been a discussion and publications in the literature about how the changed nitrogen deposition is leading to changed floral composition, and that being suggested as being inferred in, for example, changed butterfly population. I am not an expert on that. I think it is something that the public find rather interesting, because everybody spots a butterfly going past. I think this is where you would have to collect further data on the numbers of change of that. Certainly that is the logical link—that it goes from changing the plant species to changing the food quality to ultimately changing the insects and the pollinators.

Q122 **Barry Gardiner:** Ms Hawley, you wanted to come in on that, and perhaps when you do, could you address the multiple pollutants that are creating a toxic cocktail, if you like, that pollinators are having to cope with?

Ms Hawley: Yes, thank you. Just to bring that to life a bit, there is a flower called devil's-bit scabious—it is a fantastic name—but there are specific butterflies and invertebrates that are dependent on that plant. There are lots of flowers and other plants like that where there are specific dependencies between animals, plants, lichens and fungi. If you lose those wildflowers—if you do not have the devil's-bit scabious—you do not have those insects that depend on them, essentially. That is a clear link.

Like Mark said, there have been papers around pollinator decline and the link to that. I found one paper that says that the global increase in nitrogen availability plays an important role in ongoing pollinator decline, so there is a clear link there. In terms of other pollutants, obviously there is the nitrogen; there are also phosphates, which is another major agricultural fertiliser; and there are the chemical pesticides. If you are talking about this cocktail and the things that our natural environment is trying to withstand, nitrogen is a major one. I think that excess nitrogen weakens plants, lichens and fungi and makes them less able to deal with other stresses and shocks, which may be other chemical inputs. The whole ecosystem is much less resilient and able to cope with change and shocks.

Q123 **Barry Gardiner:** Professor, you talked about the £3 billion potential saving. I understand that the impact of ozone is likely to cut our wheat yields by 10% and the value of our wheat production is about £3.5 billion a year. You have quite a sizeable chunk if that is 10% that you are losing because of air pollution there.



Professor Sutton: Yes. I think we are back to the difference of sources of that. The ground-level ozone is coming mainly from the nitrogen oxides and the volatile organic compounds. Nitrogen oxide is mainly from transport sources, although as the emissions from transport sources have come down, it becomes clearer that there is also a contribution of nitrogen oxides from agricultural soils. Just like soils lose nitrate, a nitrous oxide, the greenhouse gas, they are also losing some NO_x to the air, but on the whole the biggest source of that is the transport sources. The volatile organic compounds include methane, but also lots of other non-methane compounds of rather large diversity, including—interestingly enough—biological volatile organic compounds, so terpenes and things that may be emitted, for example, by certain tree species.

We have had a few policy-swap discussions—what are we aiming for? That is the reality, that life is full of trade-offs. The policy of planting trees is of course great carbon storage, but if those extra trees increase the volatile organic compounds and that contributes to ozone formation, which is reducing crop growth, you have a trade-off there. It is mainly from combustion sources, but we cannot avoid the agricultural source of that. Also, of course, it is another threat to food security that we should not be neglecting.

Q124 **Barry Gardiner:** You have answered a lot of questions about recommendations. Are there any further recommendations that you have not mentioned that you would like to see this Committee including in its report?

Professor Sutton: Yes. I want to pick up on one. Jenny will probably have five, but that is okay. I don't think we have had any conversation today about ammonia from shipping or more generally ammonia as a replacement energy carrier. As part of decarbonisation, there is a suggestion to move towards a hydrogen economy, but hydrogen is difficult to transport and hard to compress, so let's use ammonia effectively as a hydrogen carrier. That is going back to ammonia being one nitrogen and three hydrogens. If you burn ammonia, in principle it will go to atmospheric dinitrogen plus water. Great in principle, but in practice it may be emitting nitrogen oxides, nitrous oxide, as well as what is called ammonia slip, where some of the unburnt ammonia slips out.

That is particularly seen as a source of energy for international shipping—it is hard to run a ship from one continent to another on a battery—but in principle other sectors are looking at it and even the rail network is exploring the potential for ammonia-fuelled trains. This could be another one of those examples where we have a risk of trying to meet one policy objective but end up introducing a new risk. There clearly needs to be much more evidence-gathering, as well as working out what is going to be the regulatory framework for those emissions in a world where those regulatory frameworks do not yet exist.

Q125 **Barry Gardiner:** If I can just try to compress or hone the recommendation that you would like to see, it would be that we should



HOUSE OF COMMONS

be suggesting to the Department for Environment, Food and Rural Affairs that it works with the Department for Transport to assess the impact of such future transport fuels?

Professor Sutton: I think that would be a fine recommendation. It needs to be supported by the gathering of evidence on how big these emissions are and by working out what regulatory framework is going to keep up to speed with the rather rapid developments of this new sector.

Barry Gardiner: Thank you. Ms Hawley.

Ms Hawley: I share your wish about O-level chemistry or GCSE chemistry. It has taken me a long time, but Mark has been a great teacher to me over the last 10 years in helping to get my head around this issue. This speaks to the flux between the different forms of nitrogen and the fact that we need to tackle this issue as a whole. We need a holistic approach.

We need join-up across Government Departments and that should be in the form of a national nitrogen strategy and a nitrogen balance sheet, which gives you all the flows of nitrogen in all these different forms from different sources and the different impacts, giving you the whole picture and telling you where the points are that you need to focus policy action on. That balance sheet should inform a national nitrogen strategy, which would then see this issue embedded across Government Department, including the Department for Energy Security and Net Zero, MHCLG, Treasury, Department for Transport, Department of Health and Social Care as well as DEFRA.

The excess in the nitrogen cycle is so damaging in so many ways that we need to be treating it with the same seriousness and urgency as the carbon cycle. We look across all our strategies and policies now to see the climate impacts and the carbon and greenhouse gases as a whole within them, and we need to be doing the same for nitrogen. There are huge benefits of doing that for the effectiveness of policy and the efficiency of Government spending, and the same at the farm level as well.

I would refer back to the House of Lords Environment and Climate Change Committee report on nitrogen, which has a series of excellent recommendations. The Sustainable Nitrogen Alliance's report, which Plantlife was part of, "Next Steps for Nitrogen Policy", gives a comprehensive overview of this. More specifically on agriculture, the nutrient management expert group's report from May 2024 goes much more into the associated agricultural actions and land-use recommendations.

Q126 **Barry Gardiner:** Why were the recommendations in those august reports not taken up? You mentioned the House of Lords report on nitrogen, and "Next Steps for Nitrogen Policy", so in effect you are telling us that these recommendations are there and the solutions are known. We might repeat them, but why have they not been taken up and how



can we make that important difference?

Ms Hawley: That is a very good question. We saw from the clean air strategy in 2019 the commitments that had been put in place and again they have not been delivered. I hope that this Government will do more. We have commitments now in the environmental improvement plan and I hope they will be taken forward. One thing that concerns me is the growth plans that are coming through for the sectors, including on the circular economy, the poultry sector and horticultural sector. I am not arguing against growth in those sectors, but I think there needs to be a fundamental principle of environmental sustainability and a regard for public health and animal welfare and all these other considerations. That sustainability should be at the core of those growth plans.

We must realise that regulation can be good regulation. It can benefit businesses and farmers to have that level playing field, that certainty and that package of support—the finance and the advice, as well as the clear legislation and mandation behind it. I cannot answer the question as to why they have not all been delivered. To me, the benefits are clear and it seems a missed opportunity.

Professor Sutton: A very quick answer from me on the agriculture-related recommendations. My sense is that the Government are afraid of grasping ammonia because it is agriculture. They have got used to working with the vehicle sector; it was hard, but they have got there. There is a fear, however, of embracing agriculture and that is why in the last 30 years the UK has not taken substantive action to reduce ammonia emissions. That comes back to my message from earlier about coming together, working with and showing that there is a win-win through this pathway.

Chair: Thank you very much indeed, Professor Sutton and Ms Hawley, for your evidence. I will now bring this session to a close.