



House of Commons
Environment, Food and Rural
Affairs Committee

Air quality

Fourth Report of Session 2015–16



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*Report, together with formal minutes
relating to the report*

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Environment, Food and Rural Affairs Committee

The Environment, Food and Rural Affairs Committee is appointed by the House of Commons to examine the expenditure, administration, and policy of the Department of Environment, Food and Rural Affairs and associated public bodies.

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Committee reports are published on the Committee's website at www.parliament.uk/efracom and in print by Order of the House.

Evidence relating to this report is published on the [inquiry publications page](#) of the Committee's website.

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The current staff of the Committee are David Weir (Clerk), Sian Cooke (Second Clerk), Sarah Coe (Senior Committee Specialist), Anwen Rees (Committee Specialist), Ellen Bloss (Senior Committee Assistant), Holly Knowles, (Committee Assistant) and Nick Davies (Media Officer).

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Summary

Poor air quality is damaging the UK's environment and harming the nation's health: emissions have declined significantly over many decades, but not far enough to prevent the early deaths of 40-50,000 people each year from cardiac, respiratory and other diseases linked to air pollution. The Government must act now to tackle this public health emergency: the Cabinet Office should set out before the summer recess how it will ensure that all government policies take air quality impacts into account; the Department for Environment, Food and Rural Affairs (Defra) must publish by the end of 2016 an overarching strategy for tackling all air pollutants, produced by all sectors from transport and industry to energy and farming. The Government must update Parliament annually on progress in delivering the strategy's objectives.

Clean Air Zones

Defra's plans for new Clean Air Zones to cut nitrogen dioxide pollution give councils insufficient control over implementation: 'one size fits all' Zones must not be imposed on cities from Southampton to Leeds. Communities must be able to tailor controls to meet their own circumstances, for example to charge vehicles to access Zones at certain times of day or to target specific bus routes. Defra proposes to allow only London and five other cities to charge polluting vehicles: dozens of areas elsewhere in England exceed EU limits so legislation must give charging powers to councils for use by any community which supports the approach. The Government must also devolve to councils greater flexibility over how they can use powers over traffic movement and new development and provide them with adequate funding to take the best action for their communities, inside and outside the Zones.

Cutting transport emissions

Volkswagen apologised for using software to cheat EU vehicle emissions tests. But it has not given transparent explanations or taken effective remedial action so as to regain consumer trust. The Government must ensure that vehicle company marketing claims are fully accurate and must work with the EU to establish tougher standards that cut vehicle emissions on the road.

Government incentives are needed now to establish a self-sustaining low-emissions vehicle market. Funding for new refuelling infrastructure and grants to help buy cleaner vehicles is welcome but currently insufficient to get polluting diesel vehicles off the road quickly. The Government should develop proposals now so that at the next Budget it can introduce a scheme to give those scrapping diesel vehicles over about 10 years old a discount on buying an ultra-low emissions vehicle.

Agricultural emissions

Defra must help farmers to adopt modern practices that cut emissions of greenhouse gases and local air pollutants including ammonia. Defra should survey farmers about their needs and target support where it is most needed—for example, to improve manure and nutrient management and cut methane emissions through improved feed for livestock. Better use could be made of Common Agricultural Policy money to achieve air quality improvements: at a time of financial pressure on farm incomes, such support will achieve more than additional regulation and save farmers money.

1 Our inquiry

1. Poor air quality has environmental and health impacts.¹ Each year air pollution causes 3.3 million deaths worldwide; the World Health Organisation has called this a public health emergency.² In the UK, two air pollutants alone (particulates and nitrogen dioxide) contribute to the early deaths of between 40,000 and 50,000 people.³ Air pollution also threatens biodiversity and ecosystems and has economic impacts on farming.

2. To minimise impacts, EU Directives set limits on the levels of key chemicals permissible in outdoor air,⁴ but the UK is in breach of nitrogen dioxide (NO₂) limits in 38 out of its 43 areas. In September 2015, the Department for Environment, Food and Rural Affairs published draft plans in response to a Supreme Court ruling that the Government must submit new plans to the EU Commission setting out how the UK would achieve compliance at the earliest date.⁵ In October 2015, we invited evidence on these plans as well as on the adequacy of Defra's approaches for tackling wider air pollution.

3. We have not considered emissions of all pollutants or from all sources, such as from industry and domestic and commercial buildings; we focused on transport emissions in view of their central role in Defra's plans to cut NO₂ pollution, and on agricultural emissions in light of the Department's responsibility for the sector. We also considered greenhouse gas emissions from agriculture as Defra has lead responsibility for this issue.

4. This report has three main strands: a) the Government's overarching approaches for tackling air pollution from all sectors; b) cutting transport pollution;⁶ and c) cutting agriculture's emissions of air pollutants and greenhouse gases. We are grateful to all who provided written and oral evidence.⁷

1 See Annex for description of selected key pollutants affecting health and the environment.

2 Note: Public Health England, Estimating local mortality burdens associated with particulate air pollution, April 2014, para 2.2.2, explains the basis on which mortality figures are cited; "long-term exposure to air pollution is understood to be a contributory factor to deaths...ie unlikely to be the sole cause of death to individuals...it is likely that air quality contributes a small amount to the deaths of a larger number of exposed individuals rather than being solely responsible for a number of deaths equivalent to the calculated figure".

3 "[Air pollution is now a public health emergency](#)" The Independent, 19 January 2016. Note: Defra cites increased mortality of 23,500 from nitrogen oxides (NO_x) and 29,000 from particulate pollution in its current [plans](#). A recent [study](#) by the Royal College of Physicians and the Royal College of Paediatric and Child health attributes 40,000 deaths each year to poor air quality.

4 For example [Directive 2008/50/EC](#) on Ambient Air Quality and [Directive 2001/81/EC](#) on National Emissions Ceilings for certain pollutants. The [1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone](#) also sets national emission ceilings for 2010–2020 on four pollutants (sulphur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia (NH₃).

5 R (on the application of ClientEarth) (Appellant) v Secretary of State for the Environment, Food and Rural Affairs (Respondent) [2015] UKSC 28. On appeal from [2012] EWCA Civ 897, See Supreme Court [Press Summary](#), 29 April 2015.

6 In a short inquiry and in light of work by other Committees on aviation issues we did not focus on air quality issues specific to air travel or airport expansion.

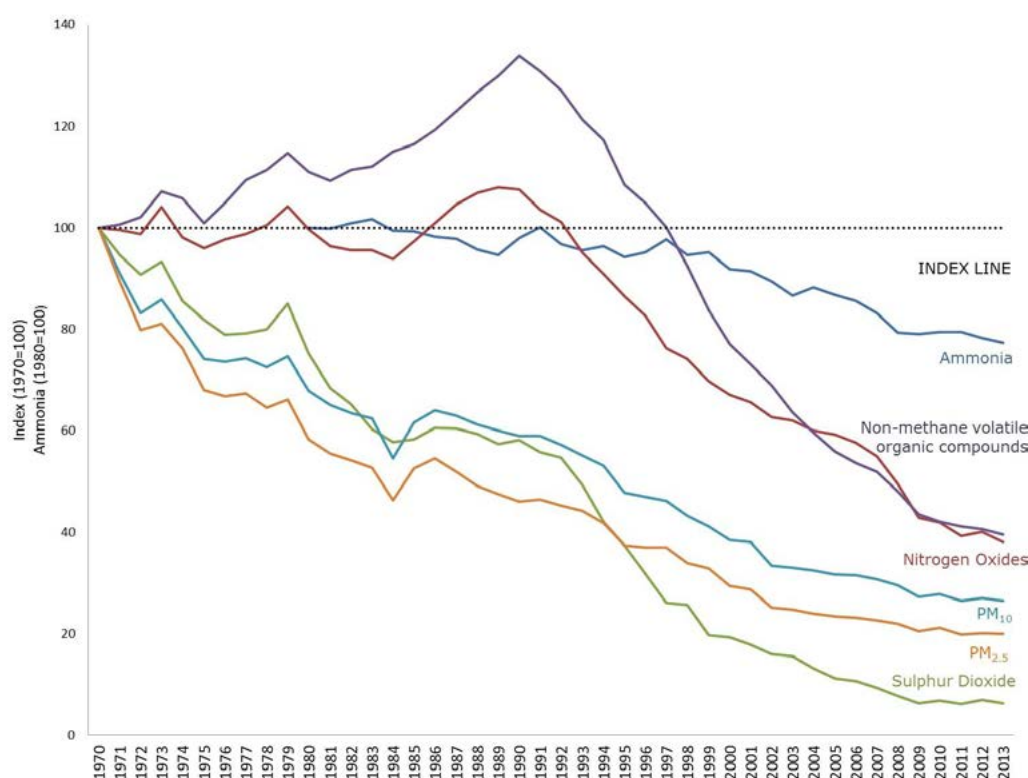
7 Oral and written evidence submitted to this inquiry can be found on the Committee's Air quality inquiry [webpage](#).

2 Strategy for improving air quality

Air quality problems

5. Everyday activities create a wide range of air pollutants from many different sources. Generating and using energy in homes, businesses and vehicles, and industrial and farming activity produces pollutants such as sulphur dioxide, nitrogen oxides, particulates, and volatile organic compounds.⁸ The UK has made significant progress in improving air quality over a number of decades; emissions have declined steeply, although the rate of reduction is levelling off. With the exception of NO₂, pollutant levels are low enough to meet legal limits, but emissions remain sufficient to cause health problems as well as harming the environment.

Figure 1: Trends in UK sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and particulate matter (PM₁₀, PM_{2.5}) emissions 1970–2013



Source: Defra, Draft plans to improve air quality in the UK: Tackling nitrogen dioxide in our towns and cities, UK overview document, September 2015

Health impacts

6. Scientific evidence has been mounting for a number of years on the impacts of air pollutants on people's health. The harmful impacts of pollution from diesel in particular have been more definitively determined; in 2012 the World Health Organisation (WHO)

⁸ Nitrogen oxides (NO_x) includes both nitric oxide (NO) and nitrogen dioxide (NO₂).

unequivocally classified it a carcinogen.⁹ Health impacts of all air pollutants cost the UK economy some £15-20 billion a year.¹⁰ More importantly many thousands of people bear the human costs associated with damaged cardiac and respiratory systems and life-limiting diseases. Defra states that NO₂ and particulates,¹¹ contribute to the early deaths of more than 50,000 people in the UK annually;¹² the Royal College of Physicians and the Royal College of Paediatric and Child Health put the figure at 40,000. The Colleges consider that neither UK government nor WHO guidelines set levels of air pollution that are “entirely safe for the whole population”. The bodies state that “when our patients are exposed to such a clear and avoidable cause of death, illness and disability, it is our duty as doctors to speak out”.¹³

Environmental impacts

7. Pollution in the air directly damages biodiversity and impedes crop growth. Once deposited into water and onto soil, it has further harmful impacts such as depleting oxygen in water bodies and killing fish and other aquatic life. England’s air and water is sufficiently polluted in 96% of sensitive habitats to pose risks to their ecosystems. The economic impacts of pollution on agriculture are also significant. For example, ground level ozone produced by nitrogen oxides reacting with other atmospheric pollutants lowers crop yields, at an estimated annual cost to UK farmers of £180 million.¹⁴

Joining up government action

8. Many witnesses, including the Local Government Association (LGA), considered that Defra failed to take a “coherent, cross-government approach”, which, if true, would be a critical omission given the range of sectors including transport, energy and agriculture which contribute to poor air quality. The LGA cited Defra’s lack of dialogue with the Department for Transport as particularly problematic.¹⁵ Although Defra is the lead department for air quality policy, the Cabinet Office has a key role in co-ordinating government action: Rt Hon Oliver Letwin MP, Chancellor of the Duchy of Lancaster, is Chair of the inter-ministerial Clean Growth Group tasked with pulling together Government approaches for tackling, amongst other things, poor air quality. Commentators consider that Group to be secretive; it does not publish information on its meetings, outcomes or action plans.¹⁶ Mr Letwin told us that, although details of meetings were not normally made public, the Group met regularly and would continue to do so for a “very considerable period” since challenges would not be overcome rapidly. The Group

9 [“UN health agency re-classifies diesel engine exhaust as ‘carcinogenic to humans’”](#), UN news centre press release, 12 June 2012

10 The Scottish Government, *Cleaner Air for Scotland, the road to a healthier future*, November 2015, is the source for the £15 billion figure. The £20 billion figure comes from the Royal College of Physicians and Royal College of Paediatrics and Child Health report, *Every breath we take*, February 2016.

11 Particulate matter (PM) is particles, including dust, dirt, soot, smoke, and liquid droplets, found in the air. Some particles are large or dark enough to be visible, others can only be detected with an electron microscope. Particles less than 10 micrometers in diameter (PM₁₀) can be inhaled and can accumulate in the respiratory system. Fine particles less than 2.5 micrometers in diameter (PM_{2.5}) are believed to pose the greatest health risks as they can lodge deeply in lungs.

12 Defra, *Defra plans to improve air quality in the UK: tackling nitrogen dioxide in our towns and cities*, UK overview document, September 2015, para 8

13 Royal College of Physicians and Royal College of Paediatrics and Child Health, *Every breath we take*, February 2016

14 Joint Nature Conservation Committee, [\(AQU12\)](#), paras 3.3-3.6

15 Local Government Association [\(AQU 27\)](#) para 2

16 [“Amber Rudd declines to reveal details of secretive ‘clean growth’ committee”](#) Business Green, 5 February 2016

aimed to ensure Defra policies were co-ordinated with other government departments' actions, for example on Clean Air Zone implementation and on the EU vehicle emissions testing regime.¹⁷

9. *Despite mounting evidence of the costly health and environmental impacts of air pollution, we see little evidence of a cohesive cross-government plan to tackle emissions. The Cabinet Office must establish clearly with all government departments their duty to consider air quality in developing policies. Furthermore, Ministers must tell the public more clearly how it is co-ordinating action since the work of the inter-ministerial Clean Growth Group is opaque; we recommend that the Cabinet Office report to Parliament before 21 July 2016 on the actions it plans over the coming year to join up effective action across government.*

Defra's air quality strategy

10. In December 2015 Defra published plans for tackling NO₂ emissions, principally from the transport sector.¹⁸ Defra's previous comprehensive air quality strategy covering all sectors was published a decade ago. Witnesses criticised this narrow focus on NO₂ emissions and highlighted gaps in policies for specific areas; for example Calor Gas Ltd considered that the use of biomass to heat homes had "gone under the radar" despite it having a "considerable" impact on life-spans.¹⁹ Furthermore, indoor air pollution is not included in recent plans; the Building Engineering Services Association called on Defra to rectify this omission since pollution levels in air worsen when air enters a building.²⁰ Harmful emissions can be created indoors too, from heating systems for example, or from the use of household cleaning products, and these can be concentrated by poor ventilation in modern, well-insulated buildings.²¹

11. Many witnesses called for an over-arching strategy for tackling pollutants from all sectors; the Joint Nature Conservation Committee considered that this would "set a common vision and a framework for delivery".²² Emerging scientific evidence on the impacts on health has also strengthened calls for such a strategy. Public health expert Professor Paul Wilkinson told us that, as epidemiological and other evidence accumulated, it would be prudent to consider all air pollutants together rather than focusing on individual constituents in isolation.²³

12. We questioned Parliamentary Under-Secretary of State for Environment and Rural Affairs, Rory Stewart MP, about Defra's approach. He referred only to the specific NO₂ plans published in December 2015.²⁴ After we finished taking evidence, in February 2016 Defra published its Departmental Plan for 2015–20. This states that Defra will invest in

17 Qq 292,293

18 Defra, [Improving air quality in the UK; Tackling nitrogen dioxide in our towns and cities: UK overview document](#), December 2015

19 Calor Gas Ltd ([AQU 08](#)) para 9. Note: the company acknowledges there is limited data on mortality linked to smaller particles produced by biomass boilers.

20 Building Engineering Services Association ([AQU 22](#))

21 Royal College of Physicians and Royal College of Paediatrics and Child Health, *Every breath we take*, February 2016

22 Joint Nature Conservation Committee, ([AQU12](#)), para 5.4

23 Professor Paul Wilkinson ([AQU 29](#)), see also evidence from the Joint Nature Conservation Committee ([AQU12](#))

24 Q291

cleaner air and will monitor levels of two pollutants, NO₂ and fine particulates. However, it makes no reference to a broader strategy or timescales for action, and it does not include indicators for measuring progress on tackling other pollutants such as ammonia.²⁵

13. Defra’s plans focus too narrowly on nitrogen dioxide pollution, principally from traffic. If the full health and environmental benefits of cleaner air are to be achieved, Defra must set out plans to cut emissions of all air pollutants and from all sources, including from the transport, industry, energy and farming sectors. Plans must aim to clean up indoor as well as outdoor air.

14. *We recommend that the Department publish by the end of 2016 a comprehensive strategy for improving air quality and report annually to Parliament on progress in delivering its objectives.*

Cost-benefit analysis

15. Pollutants such as NO₂ have health impacts in concentrations below legal limits and, as Professor Wilkinson noted, “the lower the concentrations, the greater the health benefits”.²⁶ The Chartered Institution of Water and Environmental Management (CIWEM) stated more strongly that there was no concentration limit at which exposure was considered safe, and noted that the EU set upper limits not targets.²⁷ Many witnesses urged the Government to speed up action to reduce pollution beyond current plans, but provided limited data on the costs of achieving this. Defra has published data on the impact of its current NO₂ plans but not on the cost-benefits of more radical approaches, such as banning diesel cars or limiting new building in city pollution hot-spots, which might bring emissions down to levels well below legal limits.²⁸ Neither, in the absence of a recent over-arching strategy, does Defra provide up-to-date information on the cumulative cost-benefits of policies to tackle air pollution across a range of sectors. This makes it difficult for us to reach a judgement on the implications of more ambitious plans.

16. It is also currently difficult to assign accurate and consistent values to the economic impacts of environmental problems. Witnesses, such as the Joint Nature Conservation Committee, urged the Government to establish the full environmental costs of pollution and the savings to biodiversity, farming and the countryside of reducing it since this evidence would spur greater action.²⁹ The Natural Capital Committee is currently looking at how to identify and assign values to the benefits that a healthy environment provides to society; this information will give policy-makers the potential to better evaluate the economic as well as social and environmental impacts of policies on air quality.

17. *Defra’s policies aim to cut air pollution to achieve legal limits yet threats to health and the environment remain even at lower levels. Defra must calculate whether cost-effective means can be developed for meeting tougher targets. This calculation must be based on robust evidence about the benefits of cleaner air against the costs of policies needed to achieve it, such as constraints on new development.*

²⁵ Defra, *Single Departmental Plan 2015–2020*, para 1.2

²⁶ Q2

²⁷ Chartered Institution of Water and Environmental Management ([AQU16](#)) para 11

²⁸ Defra, *Defra plans to improve air quality in the UK: tackling nitrogen dioxide in our towns and cities*, Technical report, September 2015

²⁹ Joint Nature Conservation Committee ([AQU12](#))

18. *Better information is needed; we welcome the Natural Capital Committee's work to identify and place a value on the contribution of clean air to society. Defra must develop, as soon as possible after the Natural Capital Committee produces its findings, practical tools for policy-makers to use in evaluating the costs and benefits of air quality proposals and ensure that the reasoning base for these tools is made publicly available.*

19. Whilst supporting further action on air quality, some witnesses were none the less concerned about the additional costs of regulation. The Mineral Products Association considered that its members bore increased burdens because the Environment Agency had 'gold-plated' EU environmental regulations. The Association preferred voluntary action; investment had cut cement plant emissions of dust by 83% and of oxides of nitrogen by 62% since 1998, but only a "small proportion" of this was a result of regulatory requirements.³⁰

20. **Defra's policies must provide incentives for voluntary action as a first option before additional regulation is considered. Voluntary approaches can lower pollution in the most cost-effective ways since industry can focus its efforts on actions that work best for specific activities rather than on demonstrating compliance with rules.**

Reinvigorating government policy

21. This chapter has outlined a number of recommendations to address weaknesses we consider are hampering the Government's ability to take action to cut air pollution. In summary, **the Government must accord poor air quality a priority commensurate with the toll on the nation's health and environment. Emission reduction targets must be based on scientific evidence and strategies for pollution reduction based on effective cost-benefit analyses. Ministers must set out with absolute clarity the actions required across government if the public is to be reassured that the Government is committed to improving air quality quickly and substantially.**

³⁰ Mineral Products Association ([AQU15](#)) para 13. % reductions are per tonne of cement produced.

3 Defra's nitrogen dioxide plans

22. Our inquiry was triggered in part by Defra's plans,³¹ published in draft in September 2015 and in final form in December 2015,³² for meeting EU limits on NO₂.³³ These limits are currently exceeded in 38 out of 43 UK areas.³⁴ The EU extended its deadline for compliance to 2015 but most English cities will not achieve compliance until 2020. Five cities—Birmingham, Leeds, Southampton, Derby and Nottingham—will not achieve the limits until 2025 if additional measures are not introduced. London is projected to comply by 2030 without additional measures. Defra's plans therefore set out additional measures which will enable those five cities to meet limits by 2020 and show how London will meet them by 2025.

Clean Air Zones

23. Some 80% of NO_x in areas exceeding EU limits comes from road transport so Defra's plans focus on this sector through the introduction of statutory Clean Air Zones (CAZs). Defra intends that CAZs in the five cities will discourage older, more polluting buses, taxis, coaches and lorries by charging them to access key areas. Councils will only be able to charge enough to recover scheme costs, not to raise additional revenue. Other municipal areas may introduce voluntary CAZs but councils there will not have the power to charge drivers.

24. Councils will scope out the details of schemes, including geographical extent, for local community consultation, but Defra will set national standards on vehicle emissions, and legislation will define the types of vehicle to which controls will apply. There will be four categories of Zone applying controls to:

- category A: buses, taxis and coaches only;
- category B: buses, taxis, coaches and heavy good vehicles (proposed for Southampton, Derby and Nottingham);
- category C: buses, taxis, coaches, heavy goods and light goods vehicles (proposed for Birmingham and Leeds);
- category D: buses, taxis, coaches, heavy goods and light goods vehicles and cars.

London

25. Defra's remit for the capital is principally to support and monitor the delivery of plans made by the Mayor for London; the Mayor has specific duties and powers over air

31 Defra, *Defra plans to improve air quality in the UK: tackling nitrogen dioxide in our towns and cities, UK overview document*, September 2015

32 Defra, *Improving air quality in the UK; Tackling nitrogen dioxide in our towns and cities: UK overview document*, December 2015

33 The EU Ambient Air Quality Directive sets legally binding limits for ambient concentrations of certain pollutants in the air. For NO₂, there are two limit values for the protection of human health. These require Member States to ensure that: (i) annual mean concentration levels of NO₂ do not exceed 40µg/m³; and (ii) hourly mean concentration levels of NO₂ do not exceed 200µg/m³ more than 18 times a calendar year.

34 Defra's plan acknowledges that addressing background concentrations and therefore other key pollution sources is also important. For example, emissions from industry (including energy, manufacturing, construction industry and processes) are the largest overall source of NO_x in the UK accounting for 49% of UK NO_x emissions in 2013.

quality which do not apply in other cities. London already has an extensive Low Emission Zone, operative all day, every day; vehicles including vans and lorries must meet emission standards or pay a daily charge to drive in the Zone. Since 2015 buses have had to meet tougher standards within the Zone. From 2020, a new Ultra Low Emission Zone (ULEZ) covering a narrower area of the capital (the current congestion charge area) will apply to all vehicles including cars.³⁵ The Mayor's plans also include retro-fitting buses and licensing only zero emission-capable taxis from 2018.³⁶

Views of Defra's NO₂ plans

26. Campaign group ClientEarth, which brought the 2015 case leading to the production of Defra's plans, has rejected the plans as insufficient since they do not aim to achieve UK compliance before 2025; the organisation has announced new legal action against the Government.³⁷ Witnesses criticised Defra's plans as offering too little, too late: the plans proposed action to deliver only the minimum improvements required to meet EU limits and had been produced only in response to a Supreme Court judgment.³⁸ Witnesses considered that even the plan's limited emission reduction aims would not be achieved because of several deficiencies:

27. **First, an absence of effective new measures:** the LGA considered the proposals offered "no additional options of value" and had missed an opportunity to introduce measures to cut car emissions.³⁹ Some witnesses, including Friends of the Earth, recommended that Zones limit access by both petrol and diesel cars.⁴⁰ Defra does not propose that any of the five cities in current plans would adopt measures for cars, although London's Ultra-Low Emission Zone coming into force from 2020 includes charges for cars.⁴¹

28. **Secondly, insufficient local powers:** a widespread complaint was that the plans did not devolve sufficient powers to councils. Local authorities' air quality responsibilities date back more than 20 years: in the opinion of the Institute of Air Quality Management (IAQM), "if local authorities were able to solve air quality problems using their own powers ... they would have done so already".⁴² Witnesses identified planning and transport as specific areas requiring stronger local powers: CIWEM for example recommended amending planning rules to allow councils to designate "air quality neutral zones" within which any new development must meet certain benchmarks for both building and transport emissions.⁴³ The Royal College of Physicians and the Royal College of Paediatrics and Child Health concluded that local authorities should have the power to close or divert roads to reduce traffic levels when air pollution exceeded limits.⁴⁴ Councils have certain powers to close roads temporarily, using Traffic Regulation Orders for example, for air quality purposes but, as the House of Commons Library notes, it is "not a simple thing to make an Order and can often be expensive. A local authority is unlikely to make [an Order]

35 Greater London Authority (AQU45)

36 "The Government announces plans to improve air quality in cities", Defra news release, 17 December 2015.

37 "ClientEarth takes government back to court over killer air", ClientEarth news release, 18 March 2016

38 Friends of the Earth (AQU50)

39 Local Government Association (AQU27) para 3.18

40 Friends of the Earth (AQU50)

41 See Transport for London ULEZ [webpages](#), accessed 11 April 2016

42 Institute of Air Quality Management (AQU14)

43 Chartered Institution of Water and Environmental Management (AQU16) para 19

44 Royal College of Physicians and Royal College of Paediatrics and Child Health, *Every breath we take*, February 2016, recommendation 6

unless it has a significant problem and substantial local support”.⁴⁵ The GLA also noted that councils needed more powers to be able to enforce air pollution controls.⁴⁶ Powers to charge vehicles to enter Zones are to be limited to the five most polluted cities (plus London which already has charging powers); other cities, even those currently exceeding EU pollution limits, will be able to adopt only “voluntary” Zones.

29. **Thirdly, weak national leadership:** many witnesses, while supporting local action, told us that this needed to be within the framework of a sufficiently robust national approach. The Government needed to provide councils with not only the right powers but also national leadership and vision. Nottingham City Council told us that, in putting the “majority” of the emphasis on local authorities, the Government had not achieved the right balance between national and local responsibilities.⁴⁷ The IAQM considered the emphasis on local action was unlikely to lead to success without leadership at a national level.⁴⁸

30. **Fourthly, insufficient flexibility:** a major criticism made by many witnesses was that Defra’s plans provided local communities with little flexibility to respond to local circumstances.

31. The GLA called for flexibility to determine details of Clean Air Zones locally so that access could be restricted not only based on vehicle type but on parameters such as congestion and road user safety.⁴⁹ The LGA was concerned that setting rigid categories to determine the types of vehicles over which access controls would apply could lead to perverse actions.⁵⁰ Nottingham City Council was also concerned about unintended consequences of blanket approaches: bus fares would have to rise to cover Zone charges and higher fares meant more people would use their cars, thus worsening pollution. This could be avoided if councils had the freedom to set local emissions standards for buses.⁵¹ The Freight Transport Association considered Defra’s plans to be a “blunt” tool which targeted heavy vehicles ahead of cars even though cars produced half of all traffic NO_x.⁵²

32. Ministers countered some of these arguments in oral evidence. Rory Stewart said that although only the five identified cities would be required to adopt Clean Air Zones, Defra would work with other cities that wanted to be more “ambitious” in cutting emissions below legal levels. He conceded that no NO₂ threshold was considered “safe”, and welcomed work by cities such as Oxford and York to lower emissions below the 40 micrograms per cubic metre legal limit.⁵³ The Minister explained that Defra’s role was to “lay out what we believe [is] the most straightforward way” to meet legal limits by 2020 and to provide technical expertise. He said that councils would, however, have many detailed instruments at their own disposal giving them flexibility on how to administer Zones. The Minister invited local authorities with “ingenious, more cost-effective, smarter local

45 *Roads: Traffic Regulation Orders*, Standard Note [SN6013](#), House of Commons library, November 2014

46 Greater London Authority ([AQU45](#))

47 Nottingham City Council ([AQU53](#))

48 Institute of Air Quality Management ([AQU14](#))

49 Greater London Authority ([AQU45](#))

50 Local Government Association ([AQU27](#)) para 3.18

51 Nottingham City Council ([AQU53](#))

52 Freight Transport Association ([AQU17](#))

53 Q308

ways” or who “wanted to go further” to work with Defra.⁵⁴ He said that, provided local authority areas were compliant by 2020, how they achieved compliance was “basically up to them”.⁵⁵

33. Defra’s plans for Clean Air Zones will impose a ‘one size fits all’ model on cities from Southampton to Leeds. The Department must give local authorities greater flexibility in order that they can tailor measures to best meet their local circumstances. For example, cities may find it more effective to limit vehicle access at certain times of day or to target specific bus routes rather than adopt blanket access proposals.

34. Charging powers are planned for only the five cities with the worst pollution yet dozens of areas breach EU limits: we recommend that Defra extends these powers to other councils in its Clean Air Zone legislation so that communities which wish to do so can tackle pollution hot-spots in this way.

35. We further recommend that Defra consults interested parties including local authorities and publishes revised proposals by 21 July 2016 which address concerns raised in this report. Alongside these, the Government must publish proposals to make it easier for local authorities to use powers over traffic movement and new development to tackle air pollution as and when the need arises, whether inside or outside Clean Air Zones.

Funding for local action

36. Potential measures to cut transport emissions include encouraging people to use public transport rather than their private vehicles or to walk or cycle where possible. Many cities outside the UK, such as Oslo and Bordeaux, have adopted more direct approaches by prohibiting city-centre car use, often helping city inhabitants to adapt to restrictions through introduction of better public transport, more pedestrianised areas, and efficient urban layouts with homes and businesses located in the same areas. Witnesses were concerned that funding constraints were limiting UK councils’ ability to adopt such approaches and to deliver the effective local action on which Defra’s plans rely.

37. Nottingham City Council, one of the designated Clean Air Zone cities, called on the Government to provide more targeted funding to speed up delivery of local measures. The Council drew attention to cuts in government funds for Local Transport Plans and the termination of the Sustainable Transport Fund in March 2016.⁵⁶ The GLA said it could comply with EU limits sooner if it had more funding. It noted that grant programmes, such as the Defra Air Quality Grant, had reduced over time with no government commitment to its continuation in the long-term.⁵⁷

38. Those outside the sector were also concerned about council finances. The IAQM considered councils’ “diminishing financial resources” to be a barrier to the establishment of Clean Air Zones,⁵⁸ and CIWEM called for appropriate funding for local authorities, in proportion to the cost of poor air quality.⁵⁹ Commentators calculate that this year’s

54 Q294

55 Q295

56 Nottingham City Council ([AQU53](#))

57 Greater London Authority ([AQU45](#))

58 Institute of Air Quality Management ([AQU14](#))

59 Chartered Institution of Water and Environmental Management ([AQU16](#)) para 4

grants of £500,000 for council air quality monitoring were a quarter of the level in 2011–12 and 2012–13. Some 12 projects run by eight councils have been approved for 2015–16 compared to 42 projects run by 36 councils three years ago.⁶⁰

39. We put the figures on funding cuts to Defra Minister Rory Stewart during oral evidence. He rejected claims of “that kind of decline” in investment and told us that the Government was spending around £600 million over five years on “big ticket” work including cycling, walking, and electric vehicles.⁶¹ However, ClientEarth calculated that Clean Air Zones would cost councils £24 million to establish while government grants represented a small fraction of that.⁶² Councils in the five cities covered by Defra’s plans will be permitted to set charges for Clean Air Zones so as to recoup costs, although not to raise additional revenue, but no assessment is available as to what level of charge would fully cover costs or be acceptable to local communities.

40. Since Defra’s plans rely on local action to cut pollution, councils must be given support to implement programmes to encourage people to drive less and use public transport and cycle and walk more. Defra must ensure that councils are recompensed for any costs of implementing new Clean Air Zones which they are not able to recoup from reasonable charges on drivers. Defra and the Department for Communities and Local Government must also preserve funding for wider programmes, such as those supported by the Local Sustainable Transport Fund, which can demonstrate they deliver benefits in a cost-effective manner.

60 [“Defra further slashes local air quality funding,” ENDS, 27 January 2016](#)

61 Q300

62 Q60

4 Vehicle emissions testing

EU emissions tests

41. Before a new vehicle is licensed for sale in the EU, a manufacturer must demonstrate in laboratory tests that the model emits less than a set level of key pollutants, including NO_x and particulates. These limits are set under a ‘Euro’ regime, in place since 1992.⁶³ Limits are revised periodically and standards for the latest vehicles (Euro 6) have tightened considerably. They may emit only a small fraction of pollutants permitted under the 1992 ‘Euro 1’ standards. Limits have tightened since the previous 2011 (Euro 5) standards: for example, diesel vehicles must emit 56% less NO_x.⁶⁴

42. However, there are long-standing concerns that EU laboratory tests significantly under-estimate emissions on the road. This has meant Member States’ plans to meet EU NO₂ limits have been thrown off course since they assumed much higher reductions in emissions from the newer vehicles licensed under tougher standards than have been achieved in practice. Prolonged discussions between the EU and the automotive industry on introducing better tests were given impetus following US regulators’ discovery in 2015 that Volkswagen (VW) had been fitting vehicles with illegal software (‘defeat devices’) to enable vehicles to pass laboratory tests. However, manufacturers have in any case been able to use legal means to prepare vehicles to pass the tests even though their performance would not then be replicated on the road in a consistent manner. To date only VW has been identified as using illegal methods, but disparities between laboratory and real world emissions from other manufacturers’ vehicles have also consistently proved considerable. On average across all makes of vehicle, emissions on the road are 400% higher than those measured in the lab under EU tests.⁶⁵

43. The EU is introducing new real-world tests from 2017. Commentators have criticised the EU for setting initial limits under the new tests which are twice as high as the previous laboratory test levels and for setting limits into the 2020s which are 50% higher.⁶⁶ The EU proposals state that this is to allow for the less accurate measurements gathered by tail-pipe monitors under real-world as opposed to laboratory conditions. However, as MEPs on the Brussels Environment Committee noted, the maximum discrepancy from the new method of measuring emissions is 30%.⁶⁷

44. Although Defra Minister Rory Stewart said that the UK had pushed since 2011 for real-world driving tests,⁶⁸ witnesses were unconvinced about the Government’s commitment to securing lower EU limits. According to the Guardian, the UK Government supported a level 40% above current limits to apply even as far ahead as 2021.⁶⁹ ClientEarth accused Ministers of “double speak”, in blaming the EU system for failing to reduce pollution whilst supporting less robust action from Brussels.⁷⁰ Some MEPs and commentators such as the International Council on Clean Transport criticise EU institutions for, in their

63 There is a parallel Euro regime for heavier vehicles.

64 Society of Motor Manufacturers and Traders, Euro-6 What is it? [Webpages](#) accessed 11 April 2016

65 “[EU car emissions test proposals a ‘disgraceful stitch up’](#)”, Air Quality News, 28 October 2015

66 As above

67 “[Environment MEPs oppose relaxing diesel car emission test limits](#)”, European Parliament News, 14 December 2015

68 Evidence by Rory Stewart MP to Environmental Audit Committee inquiry into Diesel emissions and air quality regulation, 27 October 2015, HC 506, [Q161](#)

69 “[UK pushing for air pollution limits to be relaxed, documents reveal](#)” the Guardian, 13 December 2015

70 Q77

view, watering down final limits in response to lobbying from the automotive industry.⁷¹ However, witnesses such as VW told us that the automotive industry agreed that the emissions testing regime needed to be improved.⁷²

45. Although it has taken far too long to agree, we welcome the adoption of a new EU real-world vehicle testing regime since current laboratory tests have routinely and significantly under-estimated emission levels. However, the new limits allow a generous leeway for measurement error and are set above current levels.

46. *The UK Government must in future negotiations argue robustly for lower EU limits which will deliver reductions on the road equal to, or better than, current laboratory limits. Tougher limits are needed to drive urgent action by the automotive industry to both improve monitoring and to reduce emissions as fast as technically possible.*

Impact of EU test inaccuracies on Defra plans

47. Uncertainty over the content and timing of the future EU emissions regime led witnesses to question the validity of the models Defra used to develop its NO₂ proposals. The Environmental Protection Association considered emissions models were based on over-optimistic assumptions,⁷³ and Gatwick Airport told us that the Government model “systematically” under-estimated emissions.⁷⁴ The LGA recommended that Defra remodel its data to reflect real-world emissions levels.⁷⁵ In contrast the GLA noted that, although Euro 6 standards had not been in place long enough to produce a mass of real-world emissions data, Defra should have been able to apply correction factors to the laboratory results from a database of ‘real world’ emissions results.⁷⁶ Defra said that it adopted caution in its assessment of the emissions levels which would be achieved in practice under new EU standards.⁷⁷

48. We note that Defra models are based on cautious assumptions about the extent to which the new EU vehicle testing regime would deliver NO₂ reductions on the road. However, a history of failure to translate theoretical standards into cleaner air in practice means that Defra must keep its assumptions under review.

49. *We recommend that Defra publishes: first, by the end of 2016 an analysis of the impact on UK air quality of Euro 6 vehicle emissions standards; and secondly, by the end of 2018, an analysis of the impact of new real-world driving emissions tests being introduced from 2017. Should either of these reports show that EU standards are in practice failing to have the impact assumed under current plans, Defra must issue revised plans including stronger measures to tackle vehicle emissions.*

71 [“EU caves in to auto industry pressure for weak emissions limits”](#) The Guardian, 28 October 2015

72 Volkswagen (AQU 46) para 15

73 Environmental Protection UK (AQU 38)

74 Gatwick Airport Ltd (AQU13)

75 Local Government Association (AQU27) para 3.9

76 Greater London Authority (AQU45)

77 Defra, *Improving air quality in the UK; Tackling nitrogen dioxide in our towns and cities: UK overview document*, December 2015

Dieseldate: Volkswagen 'defeat devices'

50. We asked VW whether its use of so-called 'defeat devices' to cheat EU emission tests had affected individual vehicle performance or pollution levels. VW apologised for its actions but argued that the use of the devices did not affect on-the-road NO_x emissions, or fuel consumption so compensation was not warranted.⁷⁸ Compensation is the subject of complex legal discussion in various countries including the US where, unlike in the UK, the company is giving customers vouchers as a goodwill gesture.⁷⁹ Paul Willis, VW UK's Managing Director, failed to answer many of the questions we put to him during an oral evidence session in January 2016, explaining that he was awaiting the outcome of a company review of events.⁸⁰ The EU is conducting a separate inquiry into the use of defeat devices and wider problems with the emissions testing regime, to report within a year.⁸¹

51. Commentators link VW's use of illegal software to wider concerns about whether consumers are being misled by manufacturers' claims about their vehicles' emissions and performance. Press coverage of research published in February 2016 highlighted the significant discrepancy in the amounts of CO₂ emitted on the road by a range of manufacturers' vehicles compared to marketing claims.⁸²

52. Volkswagen's use of illegal devices has rightly caused consumers to be sceptical about its claims on vehicle performance. The company's different treatment of UK and US customers is also unlikely to be seen as fair. Volkswagen's evidence did not persuade us that the company had fully learnt lessons about the need to be completely transparent if it is to regain customers' trust in its products.

53. *The Government must assess whether systems are sufficiently rigorous to give customers confidence that a claim about a vehicle's performance is true. Where proven to have misled customers, the company should pay appropriate compensation. The Government must act on the findings of the EU's review of emissions testing and the outcome of Volkswagen's review of its use of defeat devices to remedy any deficiencies in consumer protection regulation. The Government must also seek at a European level a review of the penalties applicable if deliberately cheating the emissions testing system, and work to ensure that these penalties are robust enough to provide a meaningful deterrent for manufacturers.*

78 Qq133-137

79 "[VW offers US customers \\$1000 vouchers as gesture of goodwill](#)", BBC News, 9 November 2015

80 Q127

81 "[Car emissions inquiry members and remit approved](#)", European Parliament News, 21 January 2016

82 "[One in five cars fail to match emission and fuel claims](#)" ADI News, 17 February 2016

5 New road transport technologies

54. New technologies can cut vehicle emissions: alternatively-fuelled vehicles can almost eliminate emissions in some cases. For example vehicles running on hydrogen or electricity have no harmful tail-pipe emissions, although there may be emissions generated in the course of producing the fuel. Fuels such as liquid petroleum gas (LPG) and compressed natural gas (CNG) produce lower levels of tail-pipe NO_x compared to petrol or diesel. Although diesel produces the highest NO_x levels of mainstream fuels, manufacturers are installing technologies such as selective catalytic reduction systems using AdBlue and lean NO_x systems, to cut emissions from many of their newer vehicles substantially.⁸³

55. Policies have in recent years incentivised diesel over petrol as diesel vehicles' higher efficiency cuts CO₂ emissions, but diesel vehicles produce higher NO_x emissions per mile. The Government now recognises that policies need to take into account both types of pollution. Organisations such as the Low Carbon Vehicle Partnership are working to ensure that policies tackle both greenhouse gas and local air pollution in tandem.⁸⁴

56. Cabinet Office Minister Oliver Letwin MP was very optimistic about the potential of new technologies, including electric vehicles, to reduce emissions.⁸⁵ However, currently there are few low emission vehicles on the road. Although double the number of electric cars were sold last year compared to the year before, overall they make up only 3% of the UK car market,⁸⁶ and more than 45% of cars registered last year were diesel.⁸⁷ In a 2015 Department for Transport survey, only 5% of drivers said that they were thinking of buying an electric car or van, while 56% said they had not really thought about it. These results had not changed significantly over the past year even though 40% of those surveyed considered environmental issues an important factor when buying a new vehicle. The most common deterrents to buying electric were difficulties in recharging, the distance that can be travelled with each charge, and the vehicle cost.⁸⁸ Against this backdrop, witnesses considered that policy interventions were needed to establish a self-sustaining market with sufficient numbers of alternatively-powered vehicles to support widespread refuelling infrastructure and affordable vehicle production.⁸⁹

57. Policy responses to develop a market for all cleaner vehicles could include:

- **Fiscal policies:** lower fuel duty rates can be effective incentives to buy less polluting vehicles. However many organisations considered that more use could be made of fuel duty policy to support alternative fuels such as LPG.⁹⁰ The Vehicle Excise Duty regime has also been used to influence vehicle choice but the GLA wanted the regime revised to take account of air pollution as well as CO₂ emissions from vehicles. At local

83 Such technologies aim to enable vehicles to meet Euro 6 diesel vehicle NO_x limits.

84 The Low Carbon Vehicle Partnership launched a communique on 1 March 2016 to demonstrate joint working to tackle air quality and climate change together. See LowCVP [webpages](#)

85 Q315

86 Q178

87 "[Have diesel cars been unfairly demonised for air pollution?](#)" The Guardian. Diesel cars made up over 34% of all cars on the road in 2013 (10.1 million) compared to just around 7.5% in 1994

88 Department for Transport, [Public attitudes towards electric vehicles](#), June 215

89 Low Carbon Vehicle Partnership ([AQU56](#))

90 UK LPG Gas Ltd ([AQU41](#))

level, the GLA offers Londoners a fiscal incentive by waiving the congestion charge for vehicles emitting less than 75g/km of CO₂ (only plug-in electric/hybrid electric vehicles currently meet this standard).⁹¹

- **Grants to buy vehicles:** Newer-technology vehicles can cost more to buy than conventional vehicles although in time greater production volumes may help to reduce costs. The Government offers some grants for low emissions vehicles. However, the GLA called for grants such as the Plug-in Grant for electric vehicles to be reviewed regularly so that consumers and the industry did not become dependent on subsidy. The GLA also noted that programmes should last at least 10 years to allow time for the vehicle market to become mature and become “suitably competitive”.⁹²
- **Diesel scrappage:** Diesel vehicles coming off the production line in 2006 were licensed under Euro 4 standards permitting three times the levels of NO_x that current models may emit under the Euro 6 standards which came into force from 2014.⁹³ The GLA was one of a number of organisations backing a diesel scrappage scheme which would give a discount on the cost of a new low-emission vehicle to an owner scrapping their older, more polluting vehicle. Such a scheme could be designed in many different ways but the Authority calculated that it could be introduced at no cost to the public purse since increased VAT revenues would cover the cost of the discounts.⁹⁴
- **Grants to convert vehicles:** government grants can cut the costs of converting fleets to run on cleaner fuels; the GLA recommended that the government provide subsidies for converting buses to run on electricity.⁹⁵
- **Support for refuelling infrastructure:** funding to establish networks of plug-in points for electric vehicles and/or refuelling stations for hydrogen or gas-powered vehicles were recommended by some witnesses.⁹⁶

58. The Government’s current package of support includes investment in a network of natural gas refuelling stations, grants to incentivise the purchase and development of alternatively fuelled commercial vehicles, and differential fuel duty rates at current levels for road fuel gases such as compressed natural gas, liquid natural gas and biomethane until March 2024. Defra invested £400 million over the last Parliament to support the market for ultra-low emission vehicles (ULEVs) with another £500 million to be spent up to 2020. The Chancellor’s 2015 autumn statement announced £600 million to provide grants of up to 35% off the cost of a low CO₂ emission car and 20% off the cost of a van, up to £8,000.⁹⁷ The March 2016 Budget included £38 million of funding for UK-wide research and development into low-emission technologies, with another £15 million specifically for such work in the Midlands.⁹⁸

91 Greater London Authority ([AQU45](#))

92 As above

93 See AA [webpages](#) on Euro emissions standards, accessed 11 April 2016

94 Greater London Authority ([AQU45](#))

95 As above

96 UK Hydrogen Fuel Cell Association ([AQU25](#))

97 HM Treasury, [Spending Review and Autumn Statement 2015](#), November 2015

98 HM Treasury, [Budget 2016 documents](#), March 2016

59. **At the current rate of change it will be many years before ultra-low emissions vehicles replace all the types of vehicles currently causing pollution. Faster progress could be made if further measures were introduced to encourage people to buy newer, unfamiliar, and in many cases more costly, technologies.**

60. *We recommend that the Government launches a diesel scrappage scheme giving grants to cut the cost of a low-emission vehicle for an owner scrapping their diesel car or van. We think it sensible to target vehicles more than 10 years old because of their high pollution levels but HM Treasury should undertake in the next six months a study to establish the details of the scheme. The study must establish in time for measures to be brought forward in the next Budget: first, the emissions levels of vehicles eligible to be bought or scrapped so the scheme achieves sufficient air quality improvements, and secondly, the level of grant necessary to incentivise sufficient take-up at the lowest cost to the public purse.*

61. Government policy supports a range of technologies but this can mean that competition from different sectors dilutes the impact of schemes and could confuse the public. Witnesses such as those representing the hydrogen,⁹⁹ and gas-powered vehicle sector argue that government support must not focus on one technology.¹⁰⁰ Developing an affordable range of options allows drivers to select the right technology for the type of journeys they are undertaking; for example those mostly driving short distance in cities might choose an electric car, whereas long-distance drivers might choose a hybrid or LPG vehicle.

62. **We endorse the Government's support for a wide range of technologies, including the provision of fiscal incentives such as lower fuel duty rates for a variety of cleaner fuels. Different technologies, such as gas-powered or hybrid vehicles on the one hand or fully electric vehicles on the other, will offer the optimum solution for different transport needs. However, the Government should not allow the need to maintain technologically neutral approaches to inhibit policy support for the research, development and implementation of low-emission technologies, particularly where there is a strong scientific case for such support.**

63. Government policy focuses on developing technology to reduce emissions from exhaust systems but vehicles' tyre and brake wear also cause pollution; 75% of transport-generated particulates are from this source.¹⁰¹ Academics urge that greater attention be given to these emissions since they contain smaller particles known to be especially harmful because of their ability to penetrate the lungs and bloodstream.¹⁰²

64. *Defra's policies must support technological developments to reduce particulates generated by the wear of vehicle brakes and tyres; the Government must commission by 21 July 2016 an assessment of any policy or research gaps on the level of emissions from these causes and methods for reducing them. The Department must ensure that EU and UK regulations reflect emerging scientific evidence on pollution from wear and tear of vehicle operation.*

99 UK Hydrogen Fuel Cell Association ([AQU25](#))

100 Calor Gas Ltd ([AQU60](#))

101 Greater London Authority ([AQU45](#))

102 Presentation to the European Commission by the Institute for Energy and Transport, *Particle emissions from brake and tyre wear: literature review*, 8 January 2014

Shipping emissions

65. We received evidence highlighting the contribution of shipping emissions to pollution; although legal limits on sulphur levels in marine fuels have had some success, witnesses considered the Government had failed to adopt some effective measures to reduce NO_x emissions.¹⁰³ Ministers noted the small percentage of all NO_x emissions which came from shipping.¹⁰⁴ Nevertheless in pollution hot-spots such as London, NO_x from shipping adds to problems in achieving EU pollution limits. The National Planning Policy Framework and associated guidance sets out broad requirements that planning decisions have regard to air quality impacts but witnesses argued that planning decisions on new ports or their expansion should specifically require provision of infrastructure so that ships at berth limit their emissions by running on electricity rather than their engines.¹⁰⁵

66. We questioned Ministers Oliver Letwin MP and Rory Stewart MP and the GLA about these points in the context of port development at Enderby Wharf on the Thames in the London Borough of Greenwich. Ministers told us that planning decisions were a matter for the local planning authority. Defra set overall thresholds for NO_x levels in the air which local authorities must meet and had advised Greenwich council on mitigation measures. Defra said that local authorities should ensure that new development was “appropriate for its location and unacceptable risks are prevented”.¹⁰⁶ Rory Stewart told us that he wished to encourage the Borough to work to have in place the right electricity generating stations to power ships at berth.¹⁰⁷ The GLA told us that £400,000 had been provided to fund mitigation measures.¹⁰⁸

67. Shipping is responsible for producing only a small proportion of emissions, but in pollution hot-spots such as London action is needed to tackle emissions from all sources. Local authorities must calculate the additional impact on air quality of all new development; planning permissions for new shipping facilities must require appropriate mitigation measures from developers. This should include, where practicable, a requirement to provide infrastructure to supply electricity to ships at berth.

103 Q44

104 Q301

105 Ralph Hardwick ([AQU31](#)) Q44 (Professor Wilkinson)

106 Defra ([AQU62](#))

107 Q297

108 Q211

6 Tackling air pollution from agriculture

68. Emissions from agriculture affect local air quality and contribute towards climate change. Emissions have declined in recent years but are still produced in sufficient quantities to harm human health and the environment, both near to their point of production and further away in urban areas.

69. Ammonia is a key pollutant produced by agricultural activity. It affects human health and ecosystems at an estimated annual cost across the EU of 70-320 billion euros.¹⁰⁹ UK emissions have declined by 28% since 1990 but the trend has been levelling off recently and predictions are of a 1% increase between 2010 and 2020.¹¹⁰ Agriculture was responsible for 82% of the UK's ammonia emissions in 2012, of which fertilisers account for around a fifth with the pigs, poultry and cattle sectors contributing the remainder.¹¹¹

70. Witnesses told us that there were a wide range of available technical options to reduce emissions such as improved systems for fertilizer application and manure handling and storage. For example, emissions could be reduced by avoiding the use of urea in fertilizer, by optimising the level of nitrogen in feed and by injecting slurries or ploughing manures into soils rapidly.

Regulation of emissions

71. The regulatory regime for agricultural emissions is patchy. Permissible levels of some pollutants are determined by various EU regulations, principally the National Emissions Ceiling Directive (NECD) which sets binding emission ceilings for each Member State for four pollutants: sulphur dioxide, NO_x, non-methane volatile organic compounds and ammonia.¹¹² However, proposals to add methane emissions from agriculture in the recent revision of the NECD were first watered down in Brussels and ultimately vetoed by the Council of Ministers. Direct regulations on the source of emissions apply only to larger pig and poultry units covered by the Industrial Emissions Directive (IED), but ammonia emissions from most agricultural activity are not regulated.

72. Last year the EU proposed stronger NECD targets on ammonia to reduce UK levels by 21% by 2030.¹¹³ Witnesses took opposite views about the level of challenge this revised limit represented. For example, the IAQM considered it modest,¹¹⁴ and academic expert Professor Sutton told us that the goal would be “easy to meet” technically.¹¹⁵ In contrast, the NFU considered the target to be “at the limit of technical feasibility” and argued for a “more realistic and achievable” 2030 target which was “affordable to the agricultural

109 Professor Mark Sutton ([AQU20](#))

110 Q23

111 Q8

112 EU national emission ceilings are upper limits for total emissions of certain air pollutants that Member States will have to respect by a certain date, to push down background concentrations and limit transboundary air pollution. Existing ceilings are in place for 2010, as set out in the UNECE Gothenburg Protocol in 1999 and the EU National Emission Ceilings Directive, NECD (2001/81/EC). New ceilings (which are called national emission reduction commitments) for 2020 were agreed recently in a revised Gothenburg Protocol, and are proposed for 2020 and 2030 in a revised NECD as part of the clean air policy package.

113 Professor Mark Sutton ([AQU20](#)) The 21% figure is a reduction from 2005 levels and represents a 14% UK reduction between 2010 and 2030.

114 Institute of Air Quality Management ([AQU14](#))

115 Professor Mark Sutton ([AQU20](#))

sector, allows for growth but also protects the environment”.¹¹⁶ There are potential savings as well as costs from reducing ammonia emissions; an estimated 2.5 billion euros could be saved annually across the EU if the nitrogen lost to the air in those emissions was instead retained to fertilise soils.¹¹⁷

Use of best practice

73. Witnesses argued that the agricultural sector had taken effective action to tackle air pollution. The NFU noted that emissions had reduced in recent years, largely due to a fall in livestock numbers but also through increasing the efficiency with which nitrogen was used.¹¹⁸ The Ulster Farmers’ Union (UFU) highlighted many initiatives by farmers in Northern Ireland to reduce emissions. Initiatives include the Manure Efficient Technology Scheme which has improved efficiency by 39% and the Nitrates Action Programme which has improved fertiliser spreading practices.¹¹⁹

74. However, some witnesses were critical of the agricultural sector’s progress to date. Academics lamented the sector’s lack of action compared to other sectors’ successes. Professor Williams noted that while NO_x emissions from transport and power generation had reduced by 64% in recent years, agricultural emissions of ammonia had reduced by just 21%. He considered that there was “still a lot to do” to cut ammonia emissions.¹²⁰ The NFU explained that farming emissions of ammonia, nitrous oxide and methane were harder to control compared to industrial sector emissions since biological processes were the source of most of the problem.¹²¹

75. Emissions may be failing to fall because many farmers do not use the best and latest technologies; Professor Sutton told us that farmers were using out-of-date technologies; some were using techniques from the 1950s.¹²² There are a wide range of programmes to support the use of modern techniques; the UFU referred for example to a scheme in Northern Ireland to help farmers invest in equipment to manage manure and slurries better but noted that the programme had been oversubscribed.¹²³ The NFU and NFU Cymru referred to the Tried and Tested programme to support English and Welsh farmers in adopting better methods.¹²⁴ However, some witnesses such as Professor Sutton considered that while academia had “a really good understanding” of the problem areas there was more limited information on how and where best practice approaches were being used by farmers.¹²⁵

76. Witnesses had differing views on whether voluntary adoption of best practice was sufficient or whether further regulation was required. Professor Sutton recommended new legislation to remedy a lack of UK regulation on ammonia concentrations. He also referred to regulatory approaches in the Netherlands and Denmark which, despite farmers’ complaints, had changed the sector’s thinking and driven successful use of best practice.

116 National Farmers’ Union and NFU Cymru ([AQU49](#))

117 Professor Mark Sutton ([AQU20](#))

118 National Farmers’ Union and NFU Cymru ([AQU49](#))

119 Ulster Farmers’ Union ([AQU47](#))

120 Q23

121 National Farmers’ Union and NFU Cymru ([AQU49](#))

122 Professor Mark Sutton ([AQU19](#))

123 Ulster Farmers’ Union ([AQU47](#))

124 National Farmers’ Union ([AQU49](#))

125 Q10

Farmers reaped the financial rewards of the better use of nutrients and these countries were now in a position to export their technologies.¹²⁶ The NFU noted that both good practice and regulation had played a part in reducing emissions and expected farmers to continue to adopt good practice provided actions were both manageable and affordable.¹²⁷ The NFU urged the Government to support research and development, data collection and monitoring and knowledge exchanges.¹²⁸ The UFU argued strongly that the outcomes were best achieved through a focus on efficiency gains and improved margins rather than compulsory limits.¹²⁹

77. The agricultural sector must step up action to reduce its contribution to national air pollution. At a time of financial pressure, support for farmers to adopt improved farming methods will be more effective than additional regulation. Decreased emissions are a win-win for the environment and for farmers, who can cut their bills by minimising nitrogen losses.

78. *We recommend that Defra surveys by the end of 2016, and in partnership with the National Farmers' Union, the extent to which the most effective air pollution approaches are being used on English farms. The Department should publish the data and report to this Committee on how it will use the information to better target, and if necessary increase, best practice support for farmers. This research will also facilitate constructive dialogue between the NFU and Defra on the technical feasibility of the current EU National Emissions Ceiling Directive targets for ammonia reduction.*

79. Witnesses argued that financial incentives were likely to spur action; some recommended for example that existing payments under the Common Agricultural Policy (CAP) could be better used to tackle air pollution. The Joint Nature Conservation Committee considered that competition with other CAP priorities was hampering this approach although, as the current CAP scheme was new, its effectiveness in reducing emissions was not yet known.¹³⁰ The NFU called for more support from Defra through agri-environment schemes, rural development funding and catchment-sensitive farming schemes.¹³¹ Professor Sutton considered Natural England's work to develop Site Nitrogen Action Plans to be a "very useful start" in linking up with the CAP scheme but that budget constraints had limited its development such that it remained a demonstration tool.¹³²

80. *Relatively low-cost interventions can reduce emissions. With finances tight, farmers are more likely to take action if Defra can provide incentives for action. The Department must publish plans by September 2016 for using CAP funds more effectively to achieve air pollution objectives. In developing this plan, Defra should identify any EU constraints on directing funds in the optimum way and, where necessary, argue in Brussels for the removal of such barriers under the next CAP reforms.*

126 Q23

127 National Farmers' Union and NFU Cymru ([AQU49](#))

128 As above and Q272

129 Ulster Farmers' Union ([AQU47](#))

130 Joint Nature Conservation Committee ([AQU12](#)) para 4.8

131 National Farmers' Union and NFU Cymru ([AQU49](#)) CAP pillar 2 funds may be used to support such schemes

132 Professor Mark Sutton ([AQU19](#))

Greenhouse gas emissions

81. The agricultural sector produces around 10% of total greenhouse gas emissions (both methane and nitrous oxide combined). Since 1990, emissions from this sector have declined due to a reduction in livestock numbers, changes in the management of manure and restrictions in the use of synthetic fertiliser. However, emissions are projected to level off in future decades. Furthermore, as the NFU notes, with other sectors making faster progress to reduce their greenhouse gas emissions, even if agricultural emissions remain static they will form an increased proportion of emissions—potentially contributing a fifth of all UK emissions by 2050.¹³³

82. The NFU told us that “addressing these longer term challenges will require a concerted effort and a willingness to consider new and novel approaches”. In 2011 the sector launched a Greenhouse Gas Action Plan to meet the climate change challenge without compromising domestic production. The Plan promotes a range of voluntary initiatives to help farmers reduce emissions whilst producing more food by using resources more efficiently.¹³⁴

Methane

83. Limits on methane emissions were proposed for the revised EU NECD Directive in 2015 but were not in the event adopted. Although such limits were supported by environmental groups, some EU agriculture groups were concerned they would place unfair cost burdens on the sector.¹³⁵ However, action can be taken to cut emissions. Academics in Nottingham as well as in countries such as the Netherlands and New Zealand, where emissions from livestock are a key greenhouse gas contributor, have looked at approaches such as modifying animal feed, using genetics and managing gut microbiology to reduce livestock emissions.¹³⁶ McDonalds has run a partnership study to investigate the potential for reducing greenhouse gas emissions from the beef sector which concluded that reductions of around 11% could be achieved through best practice in feed use, pasture management and other approaches easily adoptable at farm level.¹³⁷ However, some commentators and campaign groups such as Friends of the Earth have argued that policies are also needed to reduce meat eating in order to reduce emissions from livestock.¹³⁸

84. *The farming sector must step up action to cut methane emissions. The livestock sector in particular must do more if it wishes to resist arguments that reducing meat consumption is necessary to protect the environment. Whether through improved feed to cut methane emitted by cows or better manure spreading techniques, all farmers need to minimise their impact on climate change. Defra, learning from successful international approaches, should roll out by the end of 2016 a programme to support the spread of best practice to all farmers.*

133 National Farmers' Union and NFU Cymru ([AQU49](#))

134 As above

135 “EU National Emissions Ceilings short of the mark”, Air Quality News, 16 December 2015

136 European research media centre, [The case for low methane-emitting cattle](#), 10 January 2014

137 McDonald's, *Beef Carbon Report*, 2016

138 “[Cut meat consumption or lose the fight on climate change](#)”, Friends of the Earth blog, 26 November 2013

7 Taking action forward

85. This report has identified areas for action in both the short and longer term if air quality is to be improved to the benefit of health and the environment. The key agents for delivering this action include:

- **Local government:** local authorities are best placed to develop plans that meet local needs, provided they have the right support and the Government trusts communities with the necessary levers to take meaningful action. A ‘one size fits all’ approach will not deliver pollution reductions in city hot-spots as effectively as a range of powers and duties which can be applied flexibly. In return for these freedoms councils must work closely with their communities, including NGOs, and be transparent in the outcomes;
- **Private sector:** industry is central to delivering the technological solutions to make air pollution a problem of the past. The automotive sector, which generates revenues of £60 billion in the UK each year, is a key investor in developing cleaner vehicles.¹³⁹ It must both respond to regulation and work pro-actively to minimise emissions if governments are to trust the sector and consumers are to have confidence to buy its products. National and EU institutions enforce emissions rules but where companies such as Volkswagen have breached trust the onus is on these companies to prove their products live up to their claims. Farmers must play their part in cutting emissions, in particular of ammonia and methane.
- **National government:** Defra has the lead role in setting out a clear, overarching air quality strategy; the Cabinet Office is pivotal in linking together action by all government departments to achieve its aims. HM Treasury is key to the Government developing effective means of calculating environmental and social costs and benefits of policies and ensuring these are borne fairly and in such a way as to drive the most sustainable approaches. Departments, in particular the Departments for Communities and Local Government, for Transport, and of Energy and Climate Change are responsible for supporting local authorities by devolving the right powers, flexibilities and funding. Transport and Environment Ministers must work in Brussels to ensure regulations spur the automotive and other industries to deliver the fastest technological improvements to cut emissions.

¹³⁹ UK Trade and Investment, [Automotive industry in the UK: investment opportunities](#) web guidance, accessed 11 April 2016

The table below summarises our key recommendations with timescales for government action:

| ACTION | GOVERNMENT DEPARTMENT | TIMESCALE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Chapter 2: Strategy for improving air quality | | |
| 1. Report actions planned to join up Government air quality action in 2016–17. (para 9) | Cabinet Office | Rise of House for summer recess–21 July 2016 |
| 2. Publish comprehensive strategy for improving air quality. (para 14) | Defra | 31 December 2016 |
| 3. Annual report to Parliament on progress against air quality strategy. (para 14) | Defra | Annually (by 31 December) |
| 4. Develop practical tools for policy-makers to evaluate costs and benefits of air quality proposals. Publish the reasoning behind these tools. (para 18) | Defra | As soon as possible after relevant Natural Capital Committee outcomes are published |
| Chapter 3: Defra’s nitrogen dioxide plans | | |
| 5. Consult on and publish revised proposals for Clean Air Zones addressing concerns in this report including flexibility for council implementation and extension of charging powers to other cities. (para 35) | Defra | 21 July 2016 |
| 6. Publish proposals to make it easier for local authorities to use traffic movement and development controls. (para 35) | Defra | 21 July 2106 |
| 7. Recompense councils for costs of implementing Clean Air Zones, preserve sustainable transport funding. (para 40) | Defra | Ongoing |
| Chapter 4: Vehicle emissions testing | | |
| 8. Negotiate tougher EU vehicle emissions limits. (para 46) | Department for Transport, Defra | Ongoing ahead of future EU revisions |
| 9. Publish an analysis of Euro 6 emissions standards’ impact on UK air quality. (para 49) | Defra | 31 December 2016 |
| 10. Publish an analysis of EU real-world driving emissions tests on UK air quality. (para 49) | Defra | 31 December 2018 |
| 11. Assess rigour of consumer protection system over vehicle manufacturers’ emissions claims and act on outcomes of EU and Volkswagen reviews. (para 53) | UK Government (Department for Business, Innovation and Skills, Department for Transport, Defra) | Ongoing and in response to EU review findings expected early 2017 and Volkswagen internal review expected spring 2016 |

| ACTION | GOVERNMENT DEPARTMENT | TIMESCALE |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------|
| Chapter 5: New road transport technologies | | |
| 12. Undertake study of potential for a diesel scrappage scheme. (para 60) | HM Treasury | Study completed by 30 September 2016, measures to be included in next Budget. |
| 13. Commission assessment of policy or research gaps in particulate emissions from vehicle brake and tyre wear. (para 64) | Department for Transport, Defra | 21 July 2016 |
| Chapter 6: Tackling air pollution from agriculture | | |
| 14. Survey with National Farmers' Union approaches to minimise farm air pollution, report to Committee on use of the information to improve best practice. (para 78) | Defra | 31 December 2016 |
| 15. Publish plans for better use of CAP funds for air quality improvement. (para 80) | Defra | September 2016 |
| 16. Roll out programme to support best practice in farm methane emission reduction | Defra | 31 December 2016 |

86. We expect Defra's forthcoming Clean Air Zone legislation and wider policies to reflect this report's recommendations so as to best improve air quality to the benefit of the nation's health and environment.

Conclusions and recommendations

Joining up government action

1. Despite mounting evidence of the costly health and environmental impacts of air pollution, we see little evidence of a cohesive cross-government plan to tackle emissions. The Cabinet Office must establish clearly with all government departments their duty to consider air quality in developing policies. Furthermore, Ministers must tell the public more clearly how it is co-ordinating action since the work of the inter-ministerial Clean Growth Group is opaque; we recommend that the Cabinet Office report to Parliament before 21 July 2016 on the actions it plans over the coming year to join up effective action across government. (Paragraph 9)

Defra's air quality strategy

2. Defra's plans focus too narrowly on nitrogen dioxide pollution, principally from traffic. If the full health and environmental benefits of cleaner air are to be achieved, Defra must set out plans to cut emissions of all air pollutants and from all sources, including from the transport, industry, energy and farming sectors. Plans must aim to clean up indoor as well as outdoor air. (Paragraph 13)
3. We recommend that the Department publish by the end of 2016 a comprehensive strategy for improving air quality and report annually to Parliament on progress in delivering its objectives. (Paragraph 14)

Cost benefit analysis

4. Defra's policies aim to cut air pollution to achieve legal limits yet threats to health and the environment remain even at lower levels. Defra must calculate whether cost-effective means can be developed for meeting tougher targets. This calculation must be based on robust evidence about the benefits of cleaner air against the costs of policies needed to achieve it, such as constraints on new development. (Paragraph 17)
5. Better information is needed; we welcome the Natural Capital Committee's work to identify and place a value on the contribution of clean air to society. Defra must develop, as soon as possible after the Natural Capital Committee produces its findings, practical tools for policy-makers to use in evaluating the costs and benefits of air quality proposals and ensure that the reasoning base for these tools is made publicly available. (Paragraph 18)
6. Defra's policies must provide incentives for voluntary action as a first option before additional regulation is considered. Voluntary approaches can lower pollution in the most cost-effective ways since industry can focus its efforts on actions that work best for specific activities rather than on demonstrating compliance with rules. (Paragraph 20)

Reinvigorating government policy

7. The Government must accord poor air quality a priority commensurate with the toll on the nation's health and environment. Emission reduction targets must be based on scientific evidence and strategies for pollution reduction based on effective cost-benefit analyses. Ministers must set out with absolute clarity the actions required across government if the public is to be reassured that the Government is committed to improving air quality quickly and substantially. (Paragraph 21)

Defra's nitrogen dioxide plans

8. Defra's plans for Clean Air Zones will impose a 'one size fits all' model on cities from Southampton to Leeds. The Department must give local authorities greater flexibility in order that they can tailor measures to best meet their local circumstances. For example, cities may find it more effective to limit vehicle access at certain times of day or to target specific bus routes rather than adopt blanket access proposals. (Paragraph 33)
9. Charging powers are planned for only the five cities with the worst pollution yet dozens of areas breach EU limits: we recommend that Defra extends these powers to other councils in its Clean Air Zone legislation so that communities which wish to do so can tackle pollution hot-spots in this way. (Paragraph 34)
10. We further recommend that Defra consults interested parties including local authorities and publishes revised proposals by 21 July 2016 which address concerns raised in this report. Alongside these, the Government must publish proposals to make it easier for local authorities to use powers over traffic movement and new development to tackle air pollution as and when the need arises, whether inside or outside Clean Air Zones. (Paragraph 35)

Funding for local action

11. Since Defra's plans rely on local action to cut pollution, councils must be given support to implement programmes to encourage people to drive less and use public transport and cycle and walk more. Defra must ensure that councils are recompensed for any costs of implementing new Clean Air Zones which they are not able to recoup from reasonable charges on drivers. Defra and the Department for Communities and Local Government must also preserve funding for wider programmes, such as those supported by the Local Sustainable Transport Fund, which can demonstrate they deliver benefits in a cost-effective manner. (Paragraph 40)

EU emissions tests

12. Although it has taken far too long to agree, we welcome the adoption of a new EU real-world vehicle testing regime since current laboratory tests have routinely and significantly under-estimated emission levels. However, the new limits allow a generous leeway for measurement error and are set above current levels. (Paragraph 45)

13. The UK Government must in future negotiations argue robustly for lower EU limits which will deliver reductions on the road equal to, or better than, current laboratory limits. Tougher limits are needed to drive urgent action by the automotive industry to both improve monitoring and to reduce emissions as fast as technically possible. (Paragraph 46)

Impact of EU test inaccuracies on Defra plans

14. We note that Defra models are based on cautious assumptions about the extent to which the new EU vehicle testing regime would deliver NO₂ reductions on the road. However, a history of failure to translate theoretical standards into cleaner air in practice means that Defra must keep its assumptions under review. (Paragraph 48)
15. We recommend that Defra publishes: first, by the end of 2016 an analysis of the impact on UK air quality of Euro 6 vehicle emissions standards; and secondly, by the end of 2018, an analysis of the impact of new real-world driving emissions tests being introduced from 2017. Should either of these reports show that EU standards are in practice failing to have the impact assumed under current plans, Defra must issue revised plans including stronger measures to tackle vehicle emissions. (Paragraph 49)

Dieselgate: Volkswagen 'defeat devices'

16. Volkswagen's use of illegal devices has rightly caused consumers to be sceptical about its claims on vehicle performance. The company's different treatment of UK and US customers is also unlikely to be seen as fair. Volkswagen's evidence did not persuade us that the company had fully learnt lessons about the need to be completely transparent if it is to regain customers' trust in its products. (Paragraph 52)
17. The Government must assess whether systems are sufficiently rigorous to give customers confidence that a claim about a vehicle's performance is true. Where proven to have misled customers, the company should pay appropriate compensation. The Government must act on the findings of the EU's review of emissions testing and the outcome of Volkswagen's review of its use of defeat devices to remedy any deficiencies in consumer protection regulation. The Government must also seek at a European level a review of the penalties applicable if deliberately cheating the emissions testing system, and work to ensure that these penalties are robust enough to provide a meaningful deterrent for manufacturers. (Paragraph 53)

New road transport technologies

18. At the current rate of change it will be many years before ultra-low emissions vehicles replace all the types of vehicles currently causing pollution. Faster progress could be made if further measures were introduced to encourage people to buy newer, unfamiliar, and in many cases more costly, technologies. (Paragraph 59)
19. We recommend that the Government launches a diesel scrappage scheme giving grants to cut the cost of a low-emission vehicle for an owner scrapping their diesel

car or van. We think it sensible to target vehicles more than 10 years old because of their high pollution levels but HM Treasury should undertake in the next six months a study to establish the details of the scheme. The study must establish in time for measures to be brought forward in the next Budget: first, the emissions levels of vehicles eligible to be bought or scrapped so the scheme achieves sufficient air quality improvements, and secondly, the level of grant necessary to incentivise sufficient take-up at the lowest cost to the public purse. (Paragraph 60)

20. We endorse the Government's support for a wide range of technologies, including the provision of fiscal incentives such as lower fuel duty rates for a variety of cleaner fuels. Different technologies, such as gas-powered or hybrid vehicles on the one hand or fully electric vehicles on the other, will offer the optimum solution for different transport needs. However, the Government should not allow the need to maintain technologically neutral approaches to inhibit policy support for the research, development and implementation of low-emission technologies, particularly where there is a strong scientific case for such support. (Paragraph 62)
21. Defra's policies must support technological developments to reduce particulates generated by the wear of vehicle brakes and tyres; the Government must commission by 21 July 2016 an assessment of any policy or research gaps on the level of emissions from these causes and methods for reducing them. The Department must ensure that EU and UK regulations reflect emerging scientific evidence on pollution from wear and tear of vehicle operation. (Paragraph 64)

Shipping emissions

22. Shipping is responsible for producing only a small proportion of emissions, but in pollution hot-spots such as London action is needed to tackle emissions from all sources. Local authorities must calculate the additional impact on air quality of all new development; planning permissions for new shipping facilities must require appropriate mitigation measures from developers. This should include, where practicable, a requirement to provide infrastructure to supply electricity to ships at berth. (Paragraph 67)

Tackling agricultural emissions

23. The agricultural sector must step up action to reduce its contribution to national air pollution. At a time of financial pressure, support for farmers to adopt improved farming methods will be more effective than additional regulation. Decreased emissions are a win-win for the environment and for farmers, who can cut their bills by minimising nitrogen losses. (Paragraph 77)
24. We recommend that Defra surveys by the end of 2016, and in partnership with the National Farmers' Union, the extent to which the most effective air pollution approaches are being used on English farms. The Department should publish the data and report to this Committee on how it will use the information to better target, and if necessary increase, best practice support for farmers. This research

will also facilitate constructive dialogue between the NFU and Defra on the technical feasibility of the current EU National Emissions Ceiling Directive targets for ammonia reduction. (Paragraph 78)

25. Relatively low-cost interventions can reduce emissions. With finances tight, farmers are more likely to take action if Defra can provide incentives for action. The Department must publish plans by September 2016 for using CAP funds more effectively to achieve air pollution objectives. In developing this plan, Defra should identify any EU constraints on directing funds in the optimum way and, where necessary, argue in Brussels for the removal of such barriers under the next CAP reforms. (Paragraph 80)

Greenhouse gas emissions

26. The farming sector must step up action to cut methane emissions. The livestock sector in particular must do more if it wishes to resist arguments that reducing meat consumption is necessary to protect the environment. Whether through improved feed to cut methane emitted by cows or better manure spreading techniques, all farmers need to minimise their impact on climate change. Defra, learning from successful international approaches, should roll out by the end of 2016 a programme to support the spread of best practice to all farmers. (Paragraph 84)

Annex: Key air pollutants

- **Ammonia (NH₃):** a byproduct of agriculture, particularly livestock manure, slurry management, and fertilizers. Smaller amounts can be derived from transport and waste disposal. It is not harmful to humans or mammals but is damaging to terrestrial and aquatic ecosystems. It is a precursor to secondary particulate dispersion.
- **Nitrogen oxides (NO_x):** combustion processes (e.g. inside motor vehicles) emit a mixture of nitrogen oxides (NO_x), primarily nitric oxide (NO) which is quickly oxidised in the atmosphere to form nitrogen dioxide (NO₂). NO₂ has health impacts from penetration of the lungs and physiological systems.
- **Ozone (O₃):** not emitted directly from any sources. It is a secondary pollutant formed through the reaction of volatile organic compounds with NO_x and hydrocarbons in the presence of sunlight. Whereas nitrogen dioxide acts as a source of ozone, nitric oxide (NO) destroys ozone and acts as a local sink (NO_x-titration). For this reason, O₃ concentrations are not as high in urban areas (where high levels of NO are emitted from vehicles) as in rural areas. Ambient concentrations are usually highest in rural areas, particularly in hot, still and sunny weather conditions which give rise to summer 'smogs'.

Particulate matter (PM) includes:

- primary particles: those directly emitted from a source, including combustion and mechanical sources, such as traffic emission;
- secondary particles: those formed in the atmosphere as a result of chemical reactions between gases such as ammonia, nitrogen oxides or sulphur dioxide.

PM is conventionally defined and measured by size:

- Coarse particles (PM₁₀–PM_{2.5}): particles smaller than 10 µm (10 thousandths of a millimetre or a micron) in diameter but greater than 2.5 µm diameter. Coarser particles arise from re-suspended road dust, brake and tyre wear, sea salt, quarries and soil;
- Fine particles (PM_{2.5}–PM_{0.1}): particles less than 2.5 µm diameter, which include most combustion particles such as those emitted from diesel engine exhaust, waste burning, bonfires, and domestic biomass burning; and secondary particles of ammonium sulphate or nitrate;
- Ultrafine particles (PM_{<0.1}): particles less than 100nm diameter (100 millionths of millimetre or nanometre) which are emitted in large numbers from diesel engine exhaust.

PM has health impacts with smaller particles considered particularly harmful.

- **Sulphur dioxide (SO₂):** produced by industrial process such as combustion of fossil fuels for energy production. Exposure causes constriction of the lung's airways, particularly concerning for those suffering from asthma and/or chronic lung disease. As SO₂ is typically a precursor to secondary PM exposure, it contributes to the negative health effects of PM. Environmentally, SO₂ exposure harms plants by degrading

chlorophyll, reducing photosynthesis, increasing respiration rates and changing protein metabolism. Deposition of SO₂ pollution can acidify soil and water resulting in a loss of biodiversity often in places distant from the source of the emissions.

Formal Minutes

Wednesday 20 April 2016

Members present:

Neil Parish, in the Chair

Jim Fitzpatrick

David Simpson

Rebecca Pow

Angela Smith

Ms Margaret Ritchie

Valerie Vaz

Draft Report (*Air quality*), proposed by the Chair, brought up and read.

Ordered, That the Draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 86 agreed to.

Annex agreed to.

Summary agreed to.

Resolved, That the Report be the Fourth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[Adjourned till Wednesday 27 April at 2.00pm.]

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the [inquiry publications page](#) of the Committee's website.

Wednesday 9 December 2015

Question number

Professor Martin Williams, London School of Hygiene and Tropical Medicine, **Professor Paul Wilkinson**, King's College London, and **Professor Mark Sutton**, Centre for Ecology and Hydrology, Edinburgh [Q1–44](#)

Simon Birkett, Clean Air in London, and **Alan Andrews**, Lawyer, Health and Environment, and Clean Air Project Leader, ClientEarth [Q45–88](#)

Wednesday 13 January 2016

Andy Eastlake, Managing Director, Low Carbon Vehicle Partnership, **Mike Hawes**, Chief Executive Officer, Society of Motor Manufacturers and Traders, and **Paul Willis**, Managing Director, Volkswagen Group UK [Q89–198](#)

Wednesday 20 January 2016

Matthew Pencharz, Deputy Mayor for Environment and Energy to the Mayor of London, **Councillor Tony Newman**, Local Government Association Board Member and London Borough of Croydon, and **Councillor Nick McDonald**, Nottingham City Council [Q199–264](#)

Andrew Bauer, Deputy Director of Policy, National Farmers' Union Scotland, and **Dr Diane Mitchell**, Chief Environment Adviser, National Farmers' Union [Q265–285](#)

Wednesday 3 February 2016

Rory Stewart MP, Parliamentary Under Secretary of State for Environment and Rural Affairs, and **Mr Oliver Letwin MP**, Chancellor of the Duchy of Lancaster, Cabinet Office [Q286–384](#)

Published written evidence

The following written evidence was received and can be viewed on the [inquiry publications page](#) of the Committee's website.

AQU numbers are generated by the evidence processing system and so may not be complete.

- 1 Air Quality Group ([AQU0043](#))
- 2 British Heart Foundation ([AQU0007](#))
- 3 British Vehicle Rental And Leasing Association ([AQU0026](#))
- 4 Building Engineering Services Association ([AQU0022](#))
- 5 Calor Gas ([AQU0060](#))
- 6 Calor Gas Ltd ([AQU0008](#))
- 7 Campaign for Air Pollution Public Inquiry ([AQU0004](#))
- 8 Campaign for Air Pollution Public Inquiry ([AQU0006](#))
- 9 Campaign for Better Transport ([AQU0044](#))
- 10 City of London Corporation ([AQU0032](#))
- 11 CIWEM ([AQU0016](#))
- 12 Clean Air in London ([AQU0030](#))
- 13 CPL Industries ([AQU0024](#))
- 14 Department for Environment, Food and Rural Affairs ([AQU0010](#))
- 15 Department for Environment, Food and Rural Affairs ([AQU0062](#))
- 16 Dr Richard Lofthouse ([AQU0002](#))
- 17 Environmental Industries Commission ([AQU0051](#))
- 18 Environmental Protection UK ([AQU0038](#))
- 19 Freight Transport Association ([AQU0017](#))
- 20 Friends of the Earth ([AQU0050](#))
- 21 Gatwick Airport Ltd ([AQU0013](#))
- 22 Gatwick Airport Ltd ([AQU0055](#))
- 23 Greater London Authority ([AQU0045](#))
- 24 Green Alliance ([AQU0021](#))
- 25 Heathrow Airport ([AQU0048](#))
- 26 Institute of Air Quality Management ([AQU0014](#))
- 27 Jim Harkins ([AQU0054](#))
- 28 Joint Nature Conservation Committee ([AQU0012](#))
- 29 King's College London ([AQU0028](#))
- 30 Local Government Association ([AQU0027](#))
- 31 Local Government Association ([AQU0061](#))
- 32 London Councils ([AQU0033](#))
- 33 London Forum of Amenity and Civic Societies ([AQU0029](#))

- 34 Low Carbon Vehicle Partnership ([AQU0056](#))
- 35 Mineral Products Association ([AQU0015](#))
- 36 Mr Howard Wynne ([AQU0036](#))
- 37 Mr Ralph Hardwick ([AQU0031](#))
- 38 Mr Simon Francis ([AQU0040](#))
- 39 National Farmers' Union ([AQU0057](#))
- 40 National Farmers' Union ([AQU0049](#))
- 41 National Physical Laboratory ([AQU0023](#))
- 42 Nottingham City Council ([AQU0053](#))
- 43 Plantlife ([AQU0042](#))
- 44 Professor Mark Sutton ([AQU0019](#))
- 45 Professor Paul Wilkinson ([AQU0034](#))
- 46 Renewable Energy Association ([AQU0035](#))
- 47 Roland Gilmore ([AQU0052](#))
- 48 Royal College of Physicians ([AQU0009](#))
- 49 Society of Motor Manufacturers and Traders (SMMT) ([AQU0058](#))
- 50 Society of Motor Manufacturers and Traders (SMMT) ([AQU0018](#))
- 51 Sustainable Aviation ([AQU0011](#))
- 52 UK Hydrogen and Fuel Cell Association ([AQU0025](#))
- 53 UKLPG ([AQU0041](#))
- 54 Ulster Farmers' Union ([AQU0047](#))
- 55 Volkswagen Group UK Ltd ([AQU0046](#))
- 56 Volkswagen Group UK Ltd ([AQU0059](#))

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the [publications page](#) of the Committee's website.

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

Session 2015–16

| | | |
|----------------------|------------------------------------------------------------------------------------------------------|--------|
| First Report | Defra performance in 2014–15 | HC 443 |
| Second Report | Greyhound welfare | HC 478 |
| Third Report | Farmgate prices | HC 474 |
| First Special Report | Defra performance in 2014–15: Government Response to the Committee's First Report of Session 2015–16 | HC 894 |