Clearing the air: pollution in London

Environment Committee

LONDONASSEMBLY

Environment Committee

The Environment Committee examines all aspects of the capital's environment, by reviewing the Mayor's strategies on air quality, water, waste, climate change and energy.

Contact us

Luke Rigg
Senior Policy Adviser
Luke.Rigg@london.gov.uk

Aoife Nolan
External Communications Officer
Aoife.Nolan@london.gov.uk

Davena Toyinbo
Committee Services Manager
Davena.Toyinbo@london.gov.uk

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Foreword

Caroline Russell AM
Chair of the Environment Committee

Air pollution is affecting the daily lives and health of millions of people living in cities around the world and London is no exception. As new research is carried out, we are learning more and more about the harmful health effects caused by exposure to polluted air.

This last year, living with a respiratory pandemic has highlighted the importance of clean air and being able to trust the air we breathe as we move around our city. During the first lockdown we saw an astonishing fifty per cent drop in motor traffic on the red route network and as a result many Londoners saw traffic-free streets and tasted clean air for the first time.

Since 2016, there has been London-wide progress reducing NO_2 air pollution. The Ultra Low Emission Zone (ULEZ) has pushed out many of the dirtiest vehicles from central London and moves to electrify taxis and update the bus fleet have also helped clean up the air.

At the end of the current Mayor's term, the Committee wanted to review his many actions to clean up the air and assess what work is left to be done. We heard evidence from scientists and campaigners for clean air, and they told us their priorities.

We wrote to every London borough to get their view of the public health impact of the Mayor's school-based air quality initiatives. They told us the implementation of local measures, like school streets, has been patchy with some boroughs indicating they would welcome more support. The Mayor is setting up a London Schools' Pollution Helpdesk, which we welcome.

Beyond the well-known impacts on respiratory and heart health, we heard the latest evidence linking long-term air pollution exposure to reduced cognitive function and worsening mental health in children, as well as potential links to dementia in older people. In addition, we have heard emerging evidence of links between long-term exposure to air pollution and worse outcomes from COVID-19 infection, so we have called on the Mayor to examine these.

We have sought new analysis of air pollution near schools to understand the sources of pollution. For the 14 schools that have been exposed to air at or breaching legal NO_2 limits for

ten years, 11 of them are primary schools and nine are located near the red route network, which the Mayor controls. The red route network was set up 30 years ago, and the Committee feels it is time for a review of the impacts it has on air pollution in London.

The picture for PM2.5 is worrying, the latest modelling says that nowhere in London meets the World Health Organisation (WHO) limits. These particulates, so small that 30 of them side by side are the same as the width of a human hair, can be breathed in and enter the human bloodstream. We heard they are linked to many long-term health conditions. The Mayor has a plan to get PM2.5 across London within the WHO recommended limit by 2030, so we are asking for clear targets for how he will achieve this.

Clean air campaigner, Rosamund Adoo-Kissi-Debrah has said that she did not have the information she needed when her daughter Ella suffered periods of severe asthma due to exposure to air pollution. Ella's death is the first one to be linked to exposure to polluted air above legal limits, and a new inquest found that the principal source of this pollution was motor traffic. The Committee has asked the Mayor to provide clear information to Londoners on the health harm from air pollution, and explain to Londoners who is most at risk.

We also considered other locations where people at risk are gathered – particularly care homes and hospitals. We've asked the Mayor to extend the air quality audit programme to these locations and come back to us with his findings.

I hope this report will be a useful resource for communities and organisations campaigning for clean air across our city. Greater understanding of the harm caused by polluted air must lead to serious action to cut all sources of PM2.5 and NO_2 so Londoners can trust the air they breathe. If we are going to build back better, Londoners need a clean air recovery.

Executive Summary

Since 2012, the World Health Organization (WHO) has indicated that air pollution is the biggest environmental risk to health, stating that it causes more deaths across the world than smoking. [1] Modelling suggests that, in 2016, at the start of the current Mayor's term, two million Londoners – including 400,000 children – lived in areas that exceeded legal air pollution limits.[2] Furthermore, thousands of Londoners have died prematurely due to exposure to air pollution since 2010.[3]

The two main pollutants in London's atmosphere are Nitrogen Dioxide (NO_2) and Particulate Matter (PM2.5). These pollutants derive from different sources and affect Londoners' health in different ways.

Air pollution in London poses particularly acute risks because it is invisible to the naked eye, yet it can have damaging impacts on the physical health of Londoners; these impacts are not felt equally, with children, older people, those with pre-existing health conditions, as well as poorer and Black and Minority Ethnic (BAME) Londoners more likely to be disproportionately impacted by air pollution.[4]

There is well established evidence to show that air pollution worsens Londoners' health. The Committee is particularly concerned about the impact on the health of children and young Londoners, as experts have shown that exposure to air pollution at an early age can cause or exacerbate respiratory problems.[5][6] There is also emerging research suggesting that air pollution has an effect on the mental health and cognitive ability of young people. The Committee has taken a keen interest in the issue of air pollution at schools for several years, as children's exposure to air pollution at and around schools poses significant risks at a critical stage in their development.

In December 2020, a Coroner's verdict recorded air pollution exposure as the tragic cause of death for a young Londoner, Ella Adoo-Kissi-Debrah. This is thought to be a world first and is a landmark case, which illustrates the harmful consequences of air pollution on health and shows the need for every level of government to take further action. It is noted that the Mayor has called on the Government to take further action at a national level and said this verdict should be a "turning point".[7]

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[1] World Health Organisation, *Burden of disease from Household Air Pollution for 2012*, 2014
[2] Mayor of London, *Latest data shows two million Londoners living with illegal toxic air*, 1 April 2019
[3] European Environment Agency, *Air Quality in Europe – 2020 Report*, 23 November 2020
[4] Healthy Air, *Some suffer more than others*, 2020
[5] Air Quality Expert Group, *Particulate Matter in the United Kingdom*, April 2005
[6] London Air Quality Network, *Summary Report 2014*, March 2016
[7] Mayor of London, *Mayor responds to conclusion into the death of Ella Adoo-Kissi-Debrah,* 16 December 2020

London's experience during COVID-19 and the lockdowns has raised the profile and importance of air quality as an issue among Londoners. It has also encouraged a change in behaviour, with increased walking and cycling.[8] There is a natural opportunity to create real, long-term change in the capital.

The Committee welcomes the progress that has been made to reduce air pollution in London, specifically NO_2. The biggest single contributor to a reduction in NO_2 concentrations has been the Mayor's Ultra-Low Emission Zone (ULEZ). The Mayor's extended ULEZ is due to be implemented in October 2021, which supports further reductions in air pollution. More generally, the Committee notes the Mayor's additional action to reduce air pollution, including improvements to the Transport for London (TfL) Bus Fleet, improvements to the Taxi Fleet, electrification and green infrastructure. An overview of the Mayor's initiatives can be found in the recent 2016-2020 Air Quality report, which recognised the need for further improvements.[9]

These improvements include reducing levels of PM2.5, which remain above the WHO recommended limits at almost all (98 per cent) of London's schools. There is also further work required to continue to reduce levels of NO_2, as some schools locations are still exposed to concentrations above legal limits for NO_2 (40 micrograms per m^3)[10], ten years on from the original deadline to meet EU annual legal limits. It is important to children's health that their schools are located in areas with low levels of NO_2 and PM2.5. Current evidence suggests there is no safe level of PM2.5 exposure.[11] The Mayor should prioritise further actions at schools with air pollution levels above legal limits and continue to work to reduce air pollution, even where it has been brought within legal limits.

Approximately one third of PM2.5 in London comes from road transport, with remaining emissions largely deriving from wood burning, construction and commercial cooking.[12] Whilst the sources of PM2.5 are complex, the Mayor has clear powers to tackle the pollutant by reducing traffic and vehicle tyre wear. The extended ULEZ will reduce exposure to NO_2 significantly and help reduce PM2.5 emissions but it is not expected to bring PM2.5 within the WHO limits[13], so the Mayor should keep working to reduce PM2.5 specifically at London schools.

A good start has been made in addressing air pollution at schools, but challenges remain. For example, the Committee has received varied feedback from London boroughs on the Mayor's Schools and Nurseries Air Quality Audit Programme, which is a key Mayoral initiative to support London schools and nurseries to implement air quality measures. The Committee notes that the Mayor is launching a School Pollution Helpdesk in recognition of the additional support schools need.[14] There is still scope for further reductions in exposure to air pollution at schools so existing work should expand to cover more schools, and explore other options for further reductions.

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[8] TfL, *Travel in London – 13*, 2020
[9] Mayor of London, *Air Quality in London 2016-2020*, October 2020,
[10] Mayor of London, Press Release, *Mayor unveils plans for further reduction in pollution at schools*, November 2020
[11] Mayor of London, Press Release, *Every Londoner is exposed to dangerous toxic air*, October 2017
[12] Mayor of London, *Air Quality in London 2016-2020*, October 2020,
[13] TfL, *Proposals to strengthen LEZ and Expand ULEZ – Supporting Information Document*, Figure 50, page 92 and Table 35, November 2017
[14] Mayor of London, Press Release, *Mayor unveils plans to reduce toxic air at schools*, 10 November 2020

The Committee has published new data, generated by the Environmental Defense Fund, that provides a more detailed analysis of the factors contributing to air pollution around London's schools. The Committee welcomes the new data and hopes that the Mayor and London boroughs will use it to inform their future action in this area.

Whilst the Committee welcomes more recent Mayoral announcements to tackle air pollution at schools, such as the Schools Pollution Helpdesk, and as part of London's COVID-19 recovery through the Green New Deal, we are concerned that London may need wider powers to enable more radical solutions to the underlying contributors to pollution, particularly PM2.5.

There is a significant opportunity to build on the progress over the last few years and the behavioural changes since the pandemic to reduce air pollution in London. Specifically, this will involve a focus on schools. This could be extended to other sites, such as care homes and hospitals. This work is important to reduce exposure to traffic and other sources of PM2.5 at sites where there are vulnerable people in London.

Recommendations

Recommendation 1

The Mayor should prioritise reductions in PM2.5 levels by:[15]

a) Identifying London-specific measures to reduce PM2.5 levels in the capital.
b) Set strategic targets for reductions in NO_2 and PM2.5 levels, particularly emissions from traffic and domestic and commercial premises.

Recommendation 2

The Mayor should develop a one-year, targeted campaign, starting in May 2021, to communicate the health risks associated with exposure to air pollution for younger and older people, harnessing the growing public interest in the topic since COVID-19. As part of the campaign, the Mayor should:

a) Involve wider partners, including those from the public, private and third sectors.
b) Establish a baseline for Londoners' awareness of the issues, which will enable an assessment of the impact of the campaign with a view to extending the campaign if it is successful.

Recommendation 3

The Mayor should lead the way in exploring the relationship between air pollution on COVID-19. Specifically, the Mayor should take account of and fund further scientific research examining the links between air pollution and COVID-19 in the next six months. The research should explore the effects of exposure to air pollution on COVID-19 mortality and severe illness.

Recommendation 4

The Mayor should resource the London Schools Pollution Helpdesk properly and consider expanding its remit to support London care homes and hospitals as the COVID-19 recovery gets underway.[16]

Recommendation 5

The Mayor should conduct a review of the Schools and Nurseries Air Quality Audit Programme by October 2021. The review's aim should be to increase the uptake across the capital, with a target for 100 additional enrolled schools or nurseries on the Programme by December 2021.

Recommendation 6

[16] The Committee recognises that the date may be impacted in the event of a further resurgence in COVID-19.

The Mayor should confirm when he expects the air quality at all schools to be brought within the legal NO_2 limit. This includes the 14 schools in London in areas at or exceeding the legal NO_2 limit. If this is not within a year, he should outline an action plan to do so.

Recommendation 7

The voices of pupils, teachers, parents and local residents should be heard as part of the School Street Evaluation Project. As part of this, the Mayor and TfL should fully engage with schools and London boroughs.

Recommendation 8

The Mayor should collate best practice in tackling and monitoring air pollution in the context of COVID-19 and share it by December 2021. National and international best practice should help policy makers, at all levels of government, identify further action and learn from measures taken by other cities over 2020 and 2021.

Recommendation 9

When recovery gets underway, the Mayor should extend the Air Quality Audit Programme to London care homes and hospitals, working in partnership with London Boroughs to identify and work with the sites on the ground. Six months into this programme, the Mayor should review his engagement and return to the Committee.[17]

Recommendation 10

The Mayor should review the impact of London's Red Route network on air pollution at schools by December 2021.

[17] The Committee recognises that the date may be impacted in the event of a further resurgence in COVID-19.

Chapter one – Air pollution over time

Recommendation 1

The Mayor should prioritise reductions in PM2.5 levels by:[18]

a) Identifying London-specific measures to reduce PM2.5 levels in the capital.
b) Set strategic targets for reductions in NO_2 and PM2.5 levels, particularly emissions from traffic and domestic and commercial premises.

What is air pollution?

Air pollution is the presence of particles and gases in the Earth's atmosphere that can reach harmful concentrations.[19]

Two primary pollutants represent a specific concern to London's air quality: Nitrogen Dioxide (NO_2 and collectively known as Nitrogen Oxides, NOx) and Particulate Matter (PM; including PM10, Fine Particulate Matter – PM 2.5 and Black Carbon).[20]

Nitrogen Dioxide (NO_2)

NO_2 is a toxic gas that is produced as a result of combustion processes, most commonly found in a vehicle's engine. Approximately half of the NO_2 emissions in London derive from road transport, accounting for the fact that the highest NO_2 concentrations in London are located at congested roads. Under UK and EU legislation, there is a legal annual limit for NO_2 of 40 micrograms per cubic metre of air, which is the same limit as set out in the WHO's guidelines.[21]

Nitrogen Oxides (NOx)

NOx refers to the combination of two gases that arises when NO reacts with certain gases in the atmosphere.[22]

[19] National Geographic, *Climate 101: Air Pollution*, 4 February 2019
[20] Greater London Authority, *London Environment Strategy*, May 2018
[21] World Health Organisation, *Air quality guidelines – global updates 2005*
[22] Department for Environment, Food and Rural Affairs, *Concentrations of nitrogen dioxide*, 23 September 2020

Fine Particulate Matter (PM2.5) and Particulate Matter (PM10)

PM2.5 is particles or liquid droplets in the air with a diameter less than 2.5 micrometres, and are either naturally occurring, such as through dust, or man-made, such as through vehicle exhausts.[23] Of all PM2.5 concentrations in London, two thirds largely derive from wood burning, construction and commercial cooking. The remaining one third derives from road transport

PM10 is particulates or liquid droplets with a diameter less than 10 micrometres. Similar to PM2.5, a significant proportion (approximately one quarter) of PM10 in London derives from road transport.

Ozone (O_3)

Ozone is a secondary pollutant, produced by the chemical reaction between sunlight and other pollutants emitted by road vehicles and industry, such as NO_2. Peak concentrations typically occur in episodes which last for some days, often during particularly hot, still and sunny days.

The analysis contained in the report is based on air quality modelling in year 2019 from the Breathe London pilot project, which is founded on future projections from London Atmospheric Emissions Inventory (LAEI) 2013 (released in 2016).[24] The latest version of the LAEI, 2016, (released in 2019) does not include future emissions projections beyond 2016 so it was not possible to use that inventory. However, the LAEI 2016 does contain a much more detailed understanding of the impact of woodburning on PM2.5 levels in 2016. It is important to note that woodburning is a significant source, and one that has been growing in recent years. The 2016 LAEI estimated domestic wood burning accounted for around 16 per cent of the capital's PM2.5 emissions (±5 per cent) and, in 2017, the Environmental Research Group and NPL reported an estimated higher emissions figure for London of between 23 and 31 per cent. LAEI 2016 modelling of the distribution of emissions suggests that over three quarters of these emissions are from Outer London boroughs (78 per cent). The Committee recognises this is an issue but its trajectory is not clear given the lack of available modelling beyond 2016.

Under UK and EU legislation, there is a legal annual limit for PM2.5 of 25 µg/m^3. However, this limit allows more air pollution to occur by 2030 than the WHO's target guideline limit. In adopting the current London Environment Strategy, the Mayor indicated that the legal limit was not sufficient and stated that he would be held to account against the WHO's guideline limit (10µg/m^3) rather than the existing legal limit (25 µg/m^3). Despite ongoing work to reduce emissions in 2019, London's annual mean PM2.5 concentration was 11.6µg/m^3, within legal limits, but 16 per cent above WHO limits.

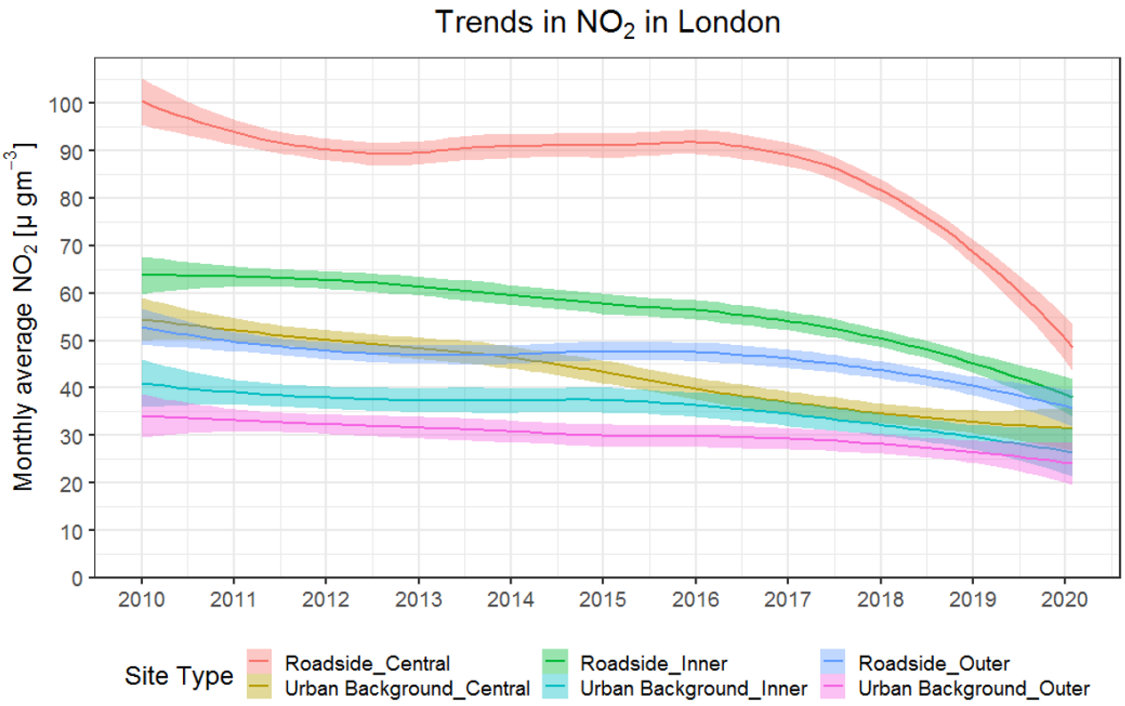
[23] Mayor of London, *Air Quality in London 2016-2020*, October 2020
[24] Environmental Defense Fund, *Global Clean Air: Mapping London pollution to clean the air*

Long-term trends

Analysis of air pollution levels in London over the last ten years shows that, overall, there has been a decline in the average NO_2 background concentrations across the capital. Over the last few years, the decline has been more significant, particularly in central London roadside locations since 2016. Figure 1 shows the monthly average of NO2 levels in micrograms per cubic metre at background and roadside locations in different parts of London.

However, equivalent analysis for the average PM2.5 concentrations shows that levels have remained relatively static over the last ten years.

Figure 1: Monthly average NO_2 concentrations in London from 2010 to 2020[25]



The Committee welcomes the progress that has been made from recent policy, particularly as it has resulted in a significant reduction (94 per cent) in the number of Londoners living in areas exceeding the legal limit for NO_2, from over 2 million in 2016 to 119,000 in 2019. Similarly, the Committee welcomes the reduction in the annual average NO_2 levels at roadside sites in central London, which was five times the national average reduction reflecting the impact of policies specific to London.[26]

[25] GLA, *Air Quality in London 2016-2020*, October 2020
[26] TfL, *Travel in London Travel in London – Report 13*, 2020 (p17)

99 per cent of Londoners still live in areas exceeding the WHO guideline limit for PM 2.5, representing very little change from 2016. It is concerning that there has been very little progress in reducing PM2.5 levels in London not just during this Mayoral term, but also more generally over the last ten years.

We recognise that reducing PM2.5 levels across London poses different challenges to policy makers at regional and local levels, as many of the contributors to PM2.5 derive from outside the capital. At the 17 November 2020 Environment Committee meeting, we heard evidence from Dr Ian Mudway that the causes of and contributors to PM2.5 are complex, and that a number of variables influence its concentration.

"London is back with a significant challenge because reducing PM2.5 is not an easy thing to do … They [emissions from vehicle tailpipes] are actually a relatively small component of PM2.5 It is larger at the roadside, but when you move away from the roadside to where the population lives, they are a relatively small fraction and there are other component parts, other sources, contributing to PM2.5 which are very challenging."

Dr Ian Mudway, Senior Lecturer in Public Health
Imperial College London

The Committee notes that the Mayor has called on the Government repeatedly to introduce national legislation to tackle PM2.5. Any new legislation will help tackle PM2.5 that derives from outside the capital, which the Committee welcomes.

It is clear that action at all levels of government is required to tackle PM2.5 comprehensively. However, there is an opportunity for the Mayor to take further action in this area while national efforts are being considered.

Regarding London-specific action, the Mayor has established infrastructure to support the capital's recovery from the pandemic. The London Recovery Board was created to define and follow a missions-based approach to the capital's recovery from COVID-19. The Board has established a Green New Deal as one of the nine recovery missions. This mission includes a stated aim to "get London's buildings to net zero emissions", which means there will need to be additional action to reduce the use of fossil fuels for heating and cooking which are some of the sources of PM2.5 the Mayor lacks clear powers over but can influence with investment and wider policy.

We therefore urge the Mayor to identify London-specific measures to reduce PM2.5 levels in the capital and support the work of the Green New Deal Recovery Mission. The work would support the Mayor's ongoing efforts to lobby the Government to do more at a national level, which the Committee endorses.

Impact of COVID-19

COVID-19 and the subsequent lockdown restrictions have dramatically impacted on air quality in London.

Evidence indicates that air pollution levels initially decreased following the pandemic. In response to a Government call for evidence, the Mayor published data that showed NO_2 levels were roughly half their usual levels on some roads before lockdown.[27] Similarly, analysis of the latest data from the Breathe London air monitoring network identified that air pollution fell by up to 50 per cent at commuter hotspots in London during lockdown.[28] The analysis focused on pollution levels during rush hour periods in the first four weeks of lockdown. During the period, on average, (NOx) levels decreased by 30 per cent around key transport routes, such as Borough High Street, South Street adjacent to Park Lane, and Cowcross Street, near Farringdon Station.

More recently, there have been some indications that air pollution may be beginning to return to pre-COVID-19 levels at some locations.[29] Particular sites, such as Marylebone Road, Brixton Road and Walbrook Wharf have seen significant increases in air pollution since lockdown, however it should be noted that these measures reflect a few monitoring sites and have not been extrapolated across London.

Data obtained by Environmental Defense Fund suggests that the pattern of congestion and traffic in London has changed dramatically since March 2020. Using data from the traffic app, *Waze*, their analysis suggests that congestion in outer London reached 153 per cent of normal levels by early September 2020. Meanwhile, central London – where the Congestion Charge was reintroduced and increased – has not seen congestion return to pre-pandemic levels.[30]

TfL's Travel in London Report also showed a variance in traffic between central London and inner and outer London. According to the report, traffic in central London has only recovered to 80 per cent of demand prior to the pandemic, whereas, in inner and outer London, it has recovered to 90 per cent. By contrast, bus demand only recovered to 60% of previous levels and the tube to only 40 per cent.[31]

The Mayor's recent Air Quality Evaluation Report identified that there was a 26 per cent reduction in hourly average NO_2 levels in central London during lockdown, and that this was in addition to a 35 per cent reduction between 2017 and early 2020, prior to COVID-19. Therefore, the reduction should not be considered in isolation from the Mayor's air quality initiatives, such as retrofitting buses, the ULEZ and low emission bus zones.[32]

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[27] Mayor of London, *Press Release, Dramatic improvements in air quality on London's roads*, 23 April 2020
[28] The Evening Standard, *Air pollution fell by up to 50 per cent at commuter hotspots in London during lockdown, study finds*, 2 July 2020
[29] The Evening Standard, *Exhaust fume pollution in London 'close to level before Covid lockdown'*, 29 September 2020
[30] Environmental Defense Fund, *Tracking London's Traffic Congestion*, November 2020
[31] TfL, *Travel in London 13*, 2020
[32] GLA, *Air Quality in London 2016-2020*, October 2020

Air pollution at schools

The Committee has taken a keen interest in the issue of air pollution at schools for several years, as children's exposure to air pollution at and around schools poses significant risks to their health and cognitive ability, at a critical stage in their development.

At the 17 November 2020 Environment Committee meeting, we heard evidence from Dr Ian Mudway about the impact of air pollution on children's cognitive ability.

> *"There is plenty of evidence coming out of Europe right now and there are studies in London ongoing also investigating whether air pollution in childhood is affecting the cognitive development of children within our cities. Certainly, studies from Barcelona have demonstrated that exposure to diesel fumes seemed to have an impact on the way in which children are able to learn.[33][34]"*
>
> **Dr Ian Mudway, Senior Lecturer in Public Health**
> **Imperial College London**

International evidence highlights the reasons the Committee has continued to prioritise this issue over the last ten years: in 2017, a report by the Fédération Internationale de l'Automobile (FIA), a motor mobility organisation, found that one in five of London's state primary and secondary schools were in areas with poor air quality in 2013.[35]

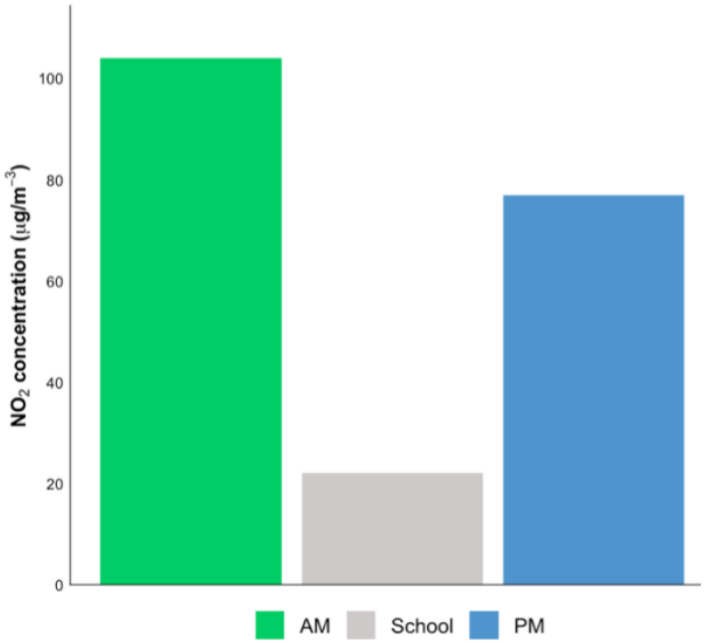
[33] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[34] Wolters Kluwer, *Traffic-related Air Pollution and Attention in Primary School Children*, March 2017
[35] The FIA Foundation, *London's Polluted Schools: The Social Context*, September 2017

CASE STUDY: Breathe London Wearables Study

In 2019, King's College London undertook a study involving more than 250 pupils at five primary schools in London to better understand their exposure to air pollution at school. The study looked at pupils' journeys to and from school and while at school. The study was the largest of its kind, sourcing 490 million measurements of NO_2 and PM2.5 concentrations over 2,000 journeys.

The study found (see figure 3) that, on average, across all schools, the pupils were exposed to levels of NO_2 five times higher when travelling to school in the morning and four times higher when returning home in the afternoon, than while at school.[36]

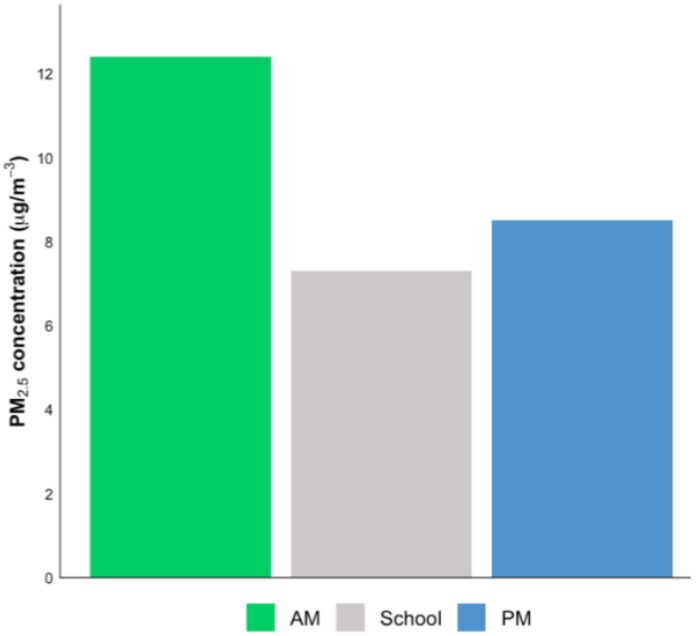
Figure 2: Average NO_2 concentrations over the monitoring period across all participating schools



Source: Breathe London Wearables Study, p7

[36] King's College London, *The Breathe London Wearables Study*, 1 October 2019

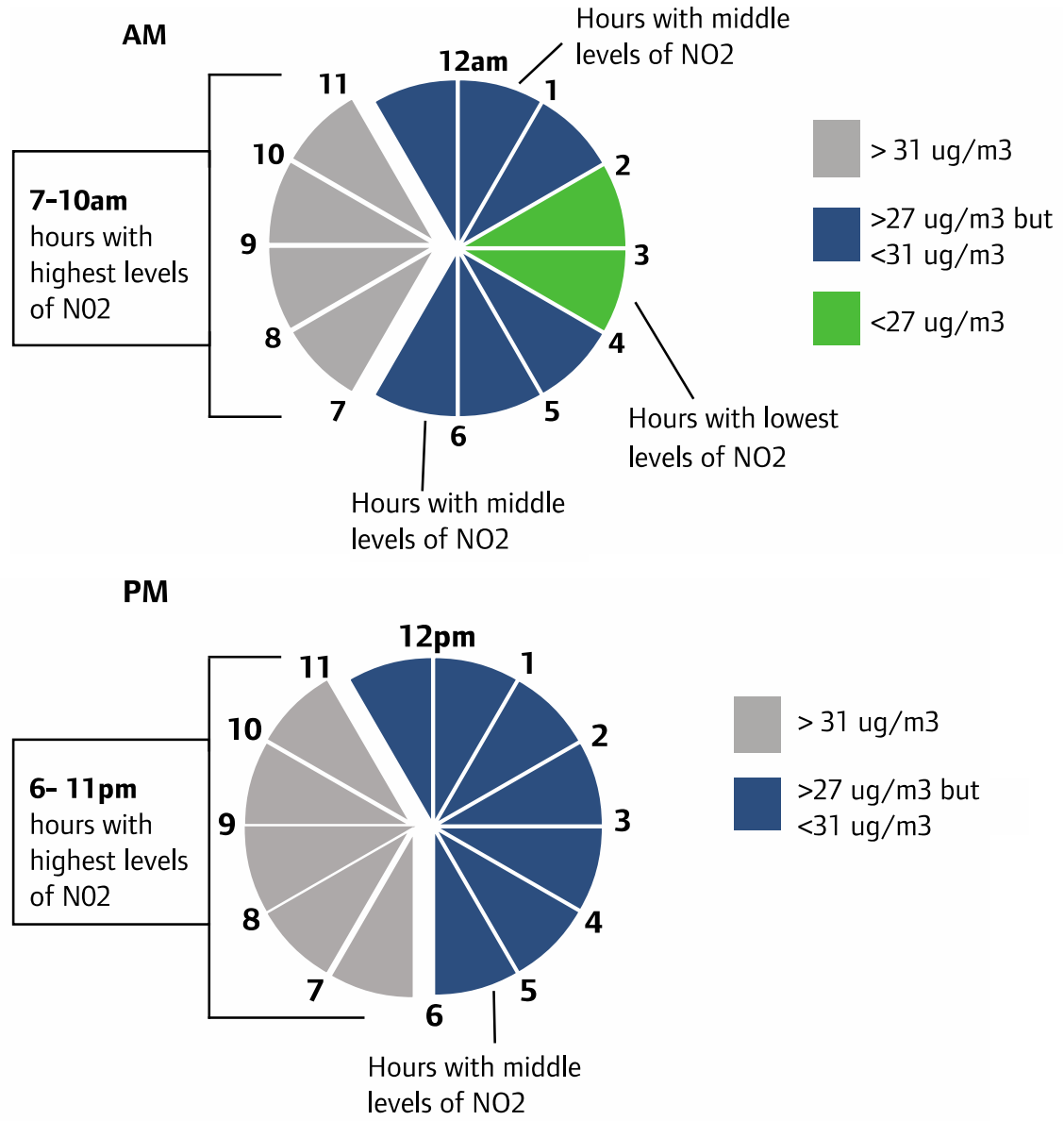
Figure 3: Average PM2.5 concentrations over the monitoring period across all participating schools
Source: Breathe London Wearables Study, p7



We know that children in London are particularly vulnerable to air pollution exposure when they travel to and from school, as well as when they are at the school building. Figures 3 and 4, which are based on new data, monitor the average hourly concentration of NO_2 and PM2.5 during the school day and show that there is a significant peak in concentrations during the morning school run.[37] For example, the median hourly NO_2 concentration 17 per cent higher between 07:00 and 09:00 than the average across all hours of the day.

[37] King's College London Environmental Research Group, *The Breathe London Wearables Study*, 1 October 2019

Figure 4: Hourly distribution of NO2 concentrations near primary schools[38]



[38] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis. Categories identified by the London Assembly Environment Committee for illustrative purposes: Highest = >31ug/m3; Middle = >27ug/m3 but <31ug/m3; Lowest = <27 ug/m3.

Figure 5: Hourly PM2.5 by source at London primary schools[39]

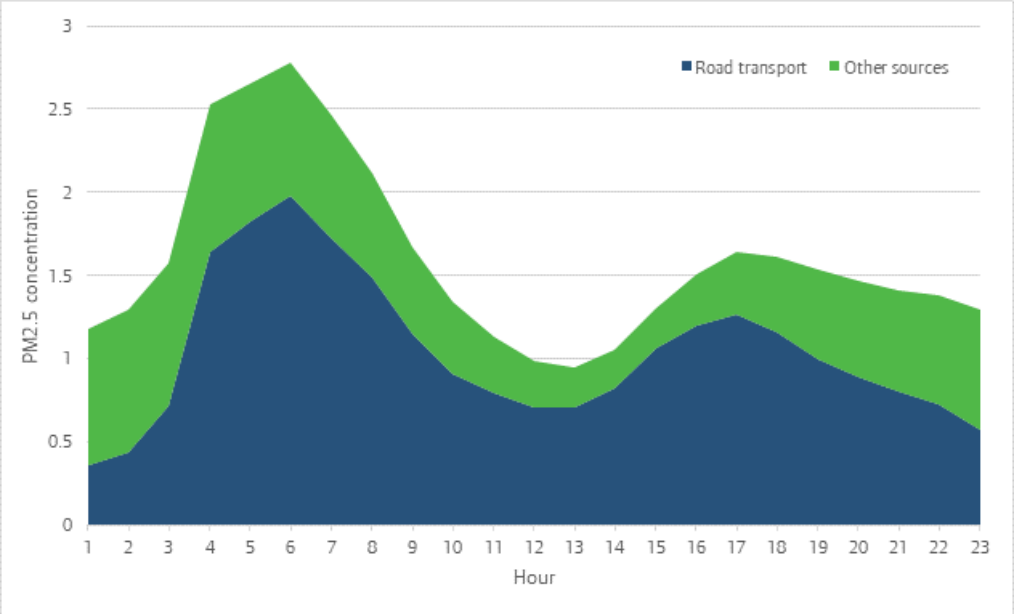


Figure 5 also shows the breakdown of local sources of PM2.5, with external sources excluded. Road transport – specifically brake, tyre and road wear – is the single biggest local source of PM2.5 at London primary schools. The figure also shows that the exposure to PM2.5 at London primary schools fluctuates significantly throughout the day. The figure shows that there is an opportunity for the Mayor to target efforts to reduce a significant proportion of London-derived PM2.5 at affected schools by tackling road transport-related emissions.

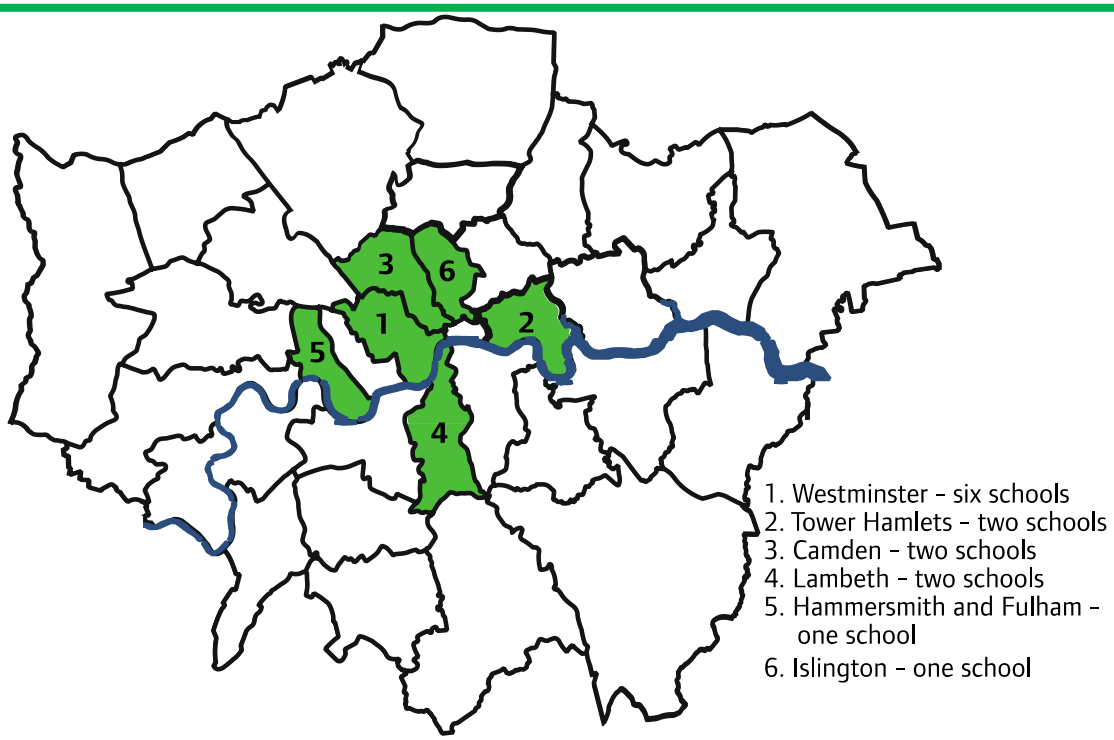
Air pollution trends at London schools

Between 2016 and 2020, the number of state primary and secondary schools in areas exceeding the legal limit for NO_2 fell from 455 to 14, which represents a reduction of 97 per cent. [40] This is a considerable achievement that is welcomed by the Committee.

During the same period, despite reductions in PM2.5 of between 21 and 25 per cent, there was only a two per cent reduction in the number of primary and secondary schools located in areas where exposure exceeds the WHO limits for PM2.5.[41] It is concerning that 14 schools in London are still exposed to NO_2 at or exceeding the legal limit.

Figure 6: State primary and secondary schools at or exceeding the legal limit for NO_2 (40 micrograms per metre cubed) in 2019[42][43]

[39] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.
[40] Mayor of London, *Air Quality in London 2016-20*, October 2020
[41] Mayor of London, *Air Quality in London 2016-20*, October 2020
[42] Mayor of London, Press Release, Mayor unveils plans to reduce toxic air at schools, November 2020
[43] Please see Appendix 3 for the full table of schools at or exceeding the legal NO2 limit.



Which schools still sit in areas with illegal NO_2 levels?

All of the 14 schools at or exceeding the legal limit are located in six inner London boroughs. Nine of the 14 (64 per cent) schools exceeding the legal limit do not have a School Street. School streets may not always be appropriate, and some of these schools are close to areas of heavy traffic. For example, Central Foundation Boys' School on Cowper Street in Islington is already on streets filtered to through traffic but nearby TfL controlled roads have high traffic levels and contribute heavily to pollution.

At this stage, the Committee cannot detail the potential impact of additional air quality measures on NO_2 levels at the 14 schools. Regardless, the issues that exist at these schools should reinforce the need to take further action to reduce air pollution in London.

The sources of air pollution at schools

Until recently, there had been very little analysis of the sources of air pollution at London's schools, which has prevented the Mayor, the London boroughs and schools from properly understanding the key factors driving pollution at different locations.

However, in November 2020, Environmental Defense Fund (EDF) Europe published research on the source apportionment to Nitrogen Oxides (NOx) concentrations at London primary schools.[44] The research, which uses Breathe London data to identify a breakdown of NOx

[44] See Appendix 1.

pollution sources at 1,795 primary schools across the capita, shows:

- Road transport sources, which are in the Mayor's control, are the greatest contributor (39 per cent), followed by domestic and commercial heat and power sources (23 per cent) and industrial process and non-road mobile machinery (8 per cent);
- Diesel cars are the largest single source contributor (16 per cent); and
- On average, road transport-related pollution levels are 19 per cent higher at inner London primary schools than outer London primary schools.

According to EDF's data, in seven London boroughs over 45 per cent of the NOx concentrations came from diesel cars. Figure 8 illustrates the source contribution to NOx concentrations at London primary schools.

An overview of EDF's methodology can be found in Appendix 1.

Figure 7: Source contribution to NOx concentrations at London primary schools (2019)[45]

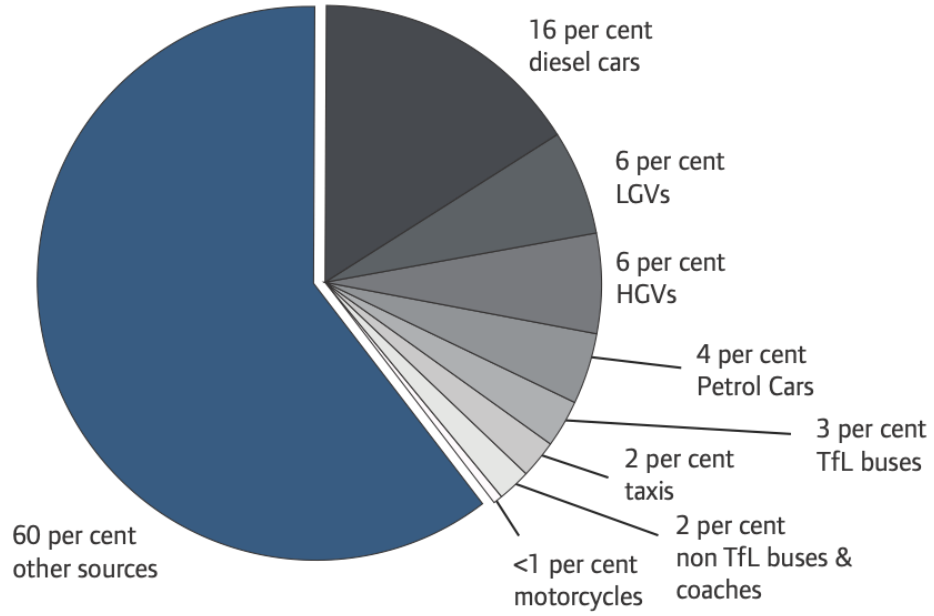


Figure 7 shows that for the road transport sources of NOx at primary schools (39 per cent), over a third (16 per cent) are from diesel cars and a further 12 per cent are from commercial traffic – vans and HGVs.

Figure 8: NOx local source annual average concentration percentage at London primary schools, inner v outer London (2019)[46]

[45] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.
[46] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.

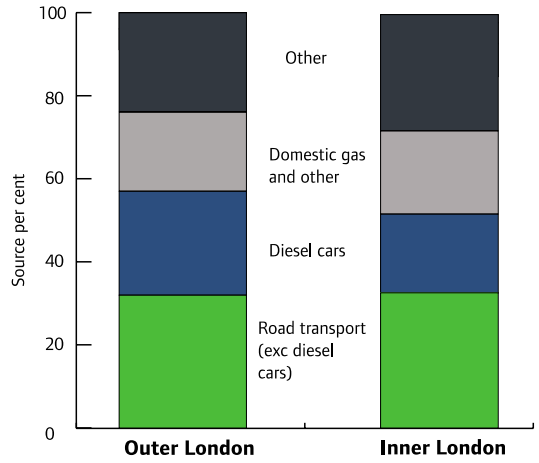


Figure 8 shows the breakdown of sources of NOx at London primary schools in inner and outer London.

Figure 9: London boroughs where the annual average NOx concentrations at primary schools are most affected by road transport and diesel cars[47]

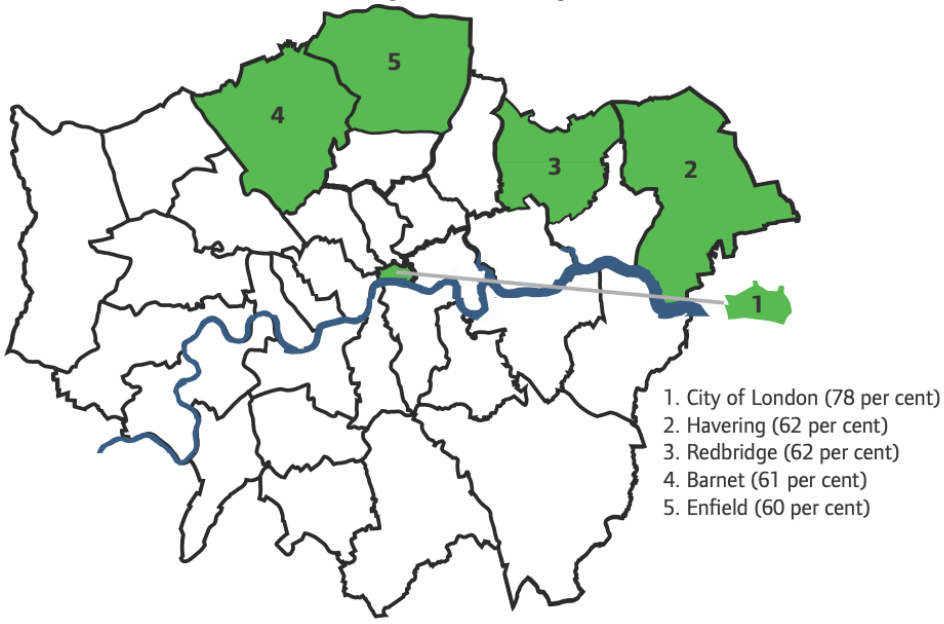


Figure 9 shows the five London boroughs where road transport and diesel car sources contribute the most (as a percentage) to annual average NOx concentrations at primary schools.

Chapter two – Health impacts of air pollution

[47] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.

Recommendation 2

The Mayor should develop a one-year, targeted campaign, starting in May 2021, to communicate the health risks associated with exposure to air pollution for younger and older people, harnessing the growing public interest in the topic since COVID-19. As part of the campaign, the Mayor should:

a) Involve wider partners, including those from the public, private and third sectors.
b) Establish a baseline for Londoners' awareness of the issues, which will enable an assessment of the impact of the campaign, with a view to extending the campaign if it is successful.

Recommendation 3

The Mayor should lead the way in exploring the relationship between air pollution on COVID-19. Specifically, the Mayor should take account of and fund further scientific research examining the links between air pollution and COVID-19 in the next six months. The research should explore the effects of exposure to air pollution on COVID-19 mortality and severe illness.

Background

Since 2012, the World Health Organization (WHO) has indicated that air pollution is the biggest environmental risk to health, stating that it causes more deaths across the world than smoking.[48]

In January 2021, the Mayor published the findings or a study, which showed that air pollution contributed to approximately 4,000 deaths in London in 2019.[49] Furthermore, thousands of Londoners died prematurely due to exposure to air pollution.[50]

Health impacts of air pollution

Physical health impacts

Exposure to air pollution has a multi-faceted impact on Londoners' health and impacts Londoners at all stages of their life. Specifically, there is robust scientific evidence linking poor air quality to the increased rates of heart disease, Chronic Obstructive Pulmonary Disease (COPD), asthma and lung cancer. Emerging evidence also suggests correlations between exposure to air pollution and type 2 diabetes, obesity and dementia.[51][52]

At the 17 November 2020 Environment Committee meeting, the Committee heard about the growing research of the impact of poor air quality on Londoners' health before birth. The study

[48] World Health Organisation, *Burden of disease from Household Air Pollution for 2012*, 2014
[49] Mayor of London, *Health burden of air pollution in London*, 25 January 2021
[50] London Air Quality Network, *Summary Report 2014*, March 2016
[51] Forum of International Respiratory Societies' Environmental Committee, *Air Pollution and Noncommunicable Diseases*, 1 February 2019
[52] British Lung Foundation and Asthma UK, *The invisible threat*, February 2021

looked at birth outcomes in London between 2006 and 2010 and demonstrated an association between exposure to PM2.5 and risk of pre-term births and stillbirths within the population.[53][54][55]

NO_2 exacerbates respiratory conditions, such as asthma, and has particularly detrimental effects on childhood development, namely the development of a child's lungs. However, PM2.5 is particularly pervasive, with evidence that short and long-term exposure to PM causes respiratory and cardiovascular illness and even death. It is likely that the most severe effects on health are caused by exposure to particles over long periods of time.[56] The UK Government's Committee on the Medical Effects of Air Pollution (COMEAP) estimates that exposure to PM2.5 contributes to 29,000 premature deaths in the UK each year.[57]

The statistics are damning. A recent Coroner's verdict recorded air pollution exposure as the cause of death of a young Londoner, Ella Adoo-Kissi-Debrah, which illustrates the devastating impact of poor air quality in London. The decision is a landmark case and demonstrates the need for every level of government to take action to reduce exposure to air pollution.

In 2019, a comprehensive global review concluded that sustained, long-term exposure to air pollution may cause damage to every organ.[58] The review found that air pollution can affect a range of physical health issues, including liver problems, lung and heart disease, diabetes, dementia, bladder cancer, brittle bones, fertility and childhood development.

The evident physical health impacts of air pollution on children are particularly significant given that those affected are at a critical stage of development of key organs, including lungs.

However, in addition to causing immediate physical health impacts for children, exposure to air pollution has determinantal effects on physical health well into adulthood. At the 17 November 2020 Environment Committee meeting, the Committee heard evidence from Dr Ian Mudway, a Senior Lecturer at Imperial College London's School of Public Health, who highlighted the adverse health trajectories for young Londoners growing up in areas with poor air quality.

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[53] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[54] Environment International, Impacts of air pollution and noise on risk of preterm birth and stillbirth in London, January 2020
[55] World Health Organisation, *Burden of disease from Household Air Pollution for 2012*, 2014
[56] Air Quality Expert Group, *Particulate Matter in the United Kingdom*, April 2005
[57] Committee on the Medical Effects of Air Pollutants, *The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom*, 2010
[58] Forum of International Respiratory Societies' Environmental Committee, *Air Pollution and Noncommunicable Diseases*, 1 February 2019

"What we must not lose sight of here is that the air you breathe now, the air you breathe when you are young, can affect your health in twenty, thirty, forty, fifty years' time.[59]"

Dr Ian Mudway, Senior Lecturer in Public Health
Imperial College London

Mental health impacts

Traditionally, research on air pollution exposure has focused on the impact on physical health. However, there is now research into how air pollution exposure can contribute to mental ill-health. Specifically, exposure to NO_2 and NOx may be associated with an increased likelihood of poor mental health in young people.[60]A 2019 population-based cohort study interviewed 2,232 children born between 1994 and 1995 in England and Wales to identify whether there was such an association. Long-term exposure to air pollution for young people could be associated with the development of mental health problems in subsequent years.[61]

Similarly, a 2019 study based on a London sub-sample of UK birth cohort found that, although no evidence was found to link childhood air pollution exposure and mental health problems at age 12, there were links at age 18.[62] The research found that there was a link between exposure to air pollution and the development of symptoms and clinically diagnosable depression and conduct disorder at age 18.

At the 17 November 2020 Environment Committee meeting, the Committee heard about research, based in the London Boroughs of Lambeth and Southwark, that showed there was an association between air pollution exposure and symptoms of depression and anxiety; and pre-clinical symptoms of psychosis.[6364]

Quantifying the health costs

The Committee publishes this report at a time when the Mayor and London Boroughs are facing budget cuts and the wider economy is still recovering from the COVID-19 pandemic. Therefore, the Committee recognises the constrained financial context in which the Mayor is operating.

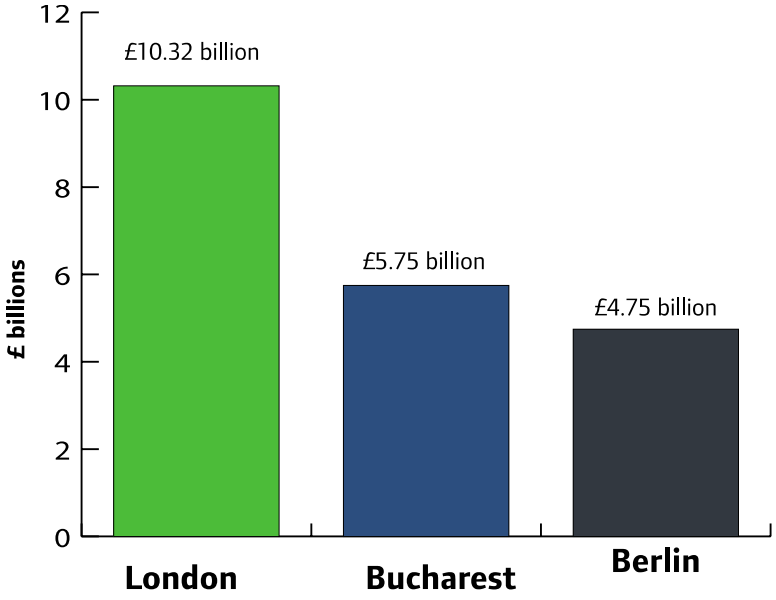
Through the investigation, the Committee found emerging research on the scale of the financial cost to cities with high levels of air pollution. Most notably, a recent study was conducted in

[59] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[60] Psychiatry Research, *Exploration of NO2 and PM2.5 air pollution and mental health problems using high-resolution data in London-based children from a UK longitudinal cohort study*, February 2019
[61] JAMA Psychiatry, *Association of Air Pollution Exposure With Psychotic Experiences During Adolescence*, 27 March 2019
[62] Psychiatry Research, *Exploration of NO2 and PM2.5 air pollution and mental health problems using high-resolution data in London-based children from a UK longitudinal cohort study*, February 2019
[63] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[64] Social Psychiatry and Psychiatric Epidemiology, Mental health consequences of urban air pollution: prospective population-based longitudinal survey, 24 October 2020

432 European cities and quantified the impacts of air pollution on physical health and monetised these as social costs.[65]

The study found that the physical health costs of air pollution from roads were higher in London than any other city in the study. The costs to London were calculated at £10.32 billion per year, which was significantly higher than the next highest ranked cities (£5.75 billion in Bucharest; £4.75 billion in Berlin). It should be noted that London's population is higher than Bucharest and Berlin, however this should not negate from the need to take action early and lead the way internationally.

Figure 10: Physical health costs of air pollution in London, Bucharest and Berlin, monetised as social costs[66]



At the 17 November 2020 Environment Committee meeting, Dr Mudway told the Committee that there had been limited work to quantify the costs associated with mental health exacerbated by air pollution.[67]

"We have costed the impact of the cardiovascular and respiratory risks on the population but we have not costed the impacts of air pollution on mental health and dementia, as those are significant burdens that do not just fall on central Government but fall on local government as well."

[65] CE Delft, *Health costs of air pollution in European cities and the linkage with transport*, October 2020
[66] CE Delft, *Health costs of air pollution in European cities and the linkage with transport*, October 2020
[67] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020

Dr Ian Mudway, Senior Lecturer in Public Health Imperial College London

In light of this information, the Committee believes that the costs of poor physical health to public services and the wider London economy should be considered when assessing the financial cost of implementing additional air quality measures in the capital.

Disproportionate impact of air pollution

Research suggests the impact of air pollution on Londoners' health is not felt equally. In the case of BAME Londoners, a 2019 report commissioned by the Mayor indicated that the difference in average NO2 concentrations between areas where white and non-white groups were most likely to live would reduce by 60 per cent between 2013 and a modelled scenario for the Mayor's Environment Strategy outcomes by 2030.[68]

[68] Aether, Air Pollution Exposure in London: Impact of the London Environment Strategy, January 2019

Figure 11: Average NOx concentration at London primary schools, by IMD decile[69][70]

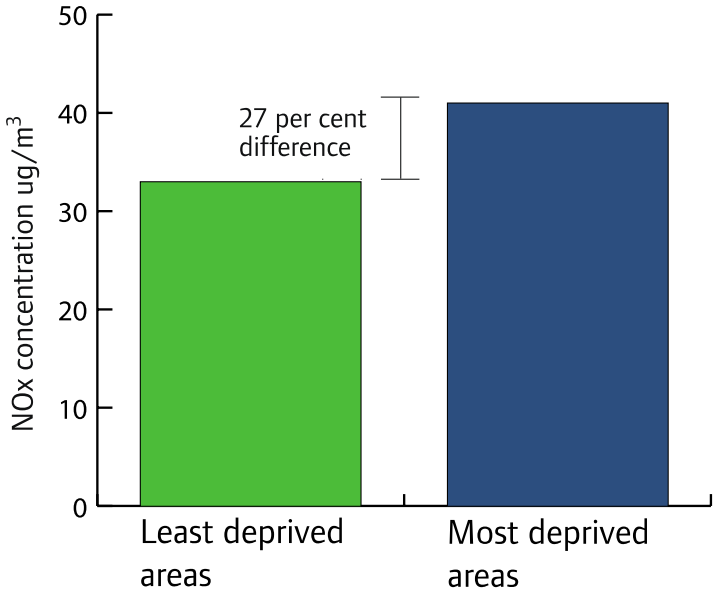
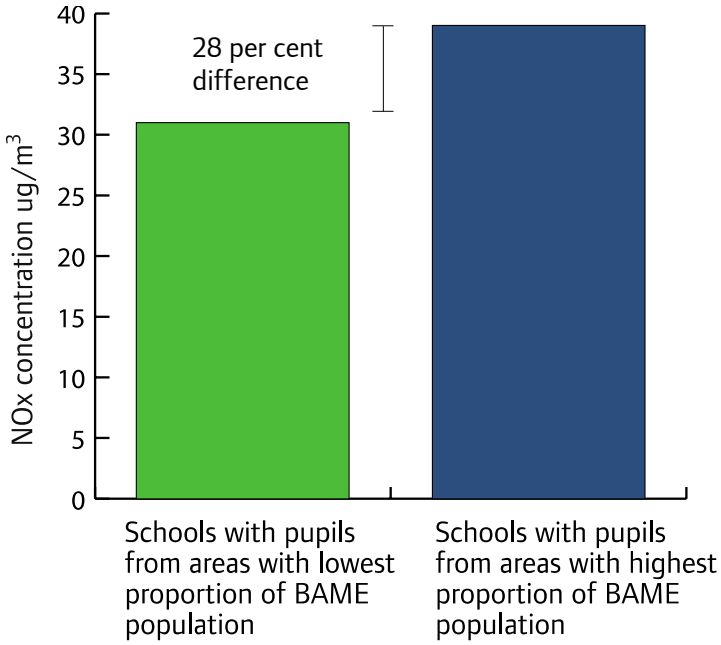


Figure 11 shows that the average (median) NOx concentration is 27 per cent higher at London primary schools in the most deprived areas than at London primary schools in the least deprived areas.

Figure 12: Average NOx concentration at London primary schools, by ethnicity[71]



[69] Indices of multiple deprivation are calculated by ranking the 32,844 LSOAs in England from most deprived to least deprived and dividing them into 10 equal groups.
[70] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.
[71] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.

Figure 12 shows that the average (median) NOx concentration is 28 per cent higher at London primary schools with pupils from areas with the highest proportion of BAME population than at London primary schools with pupils from areas with the lowest proportion of BAME population.

Air pollution affects infants' and children's health as their hearts and lungs develop,[72] and there is evidence that high levels of NO_2 can inflame airways in people's lungs and, over a long period of time, affect how well the lungs function. People with asthma are particularly affected.[73] Recent research, published in the British Medical Journal, found that exposure to increased levels of air pollution can lead to the development of asthma in children.[74] In particular, children growing up exposed to PM2.5 are more likely to have reduced lung function and develop asthma.[75]

The empirical evidence supports the Committee's understanding of the health impacts on children in London. At our roundtable event at Haimo Primary School in April 2019, the Committee heard directly from pupils, parents and staff about the impact of air pollution on children's health. In particular, the Committee heard that air pollution had continued to have a troubling effect on pupils' asthma – either causing asthma in the first place or exacerbating existing asthma.

[72] British Medical Journal, *Most of London's NHS facilities exceed legal air pollution limits*, 14 June 2017, and map
[73] Air Quality Expert Group, Nitrogen Dioxide in the United Kingdom, 2004
[74] British Medical Journal, *Air pollution and family related determinants of asthma onset and persistent wheezing in children: nationwide case-control study*, 19 August 2020
[75] Mayor of London, *Air Quality in London 2016-2020*, October 2020

Case Study: Environment Committee Roundtable Event at Haimo Primary School

The Committee has previously explored the impact of poor air quality in and around schools. In April 2019, the Committee held a roundtable event at a London primary school (Haimo Primary School, LB Greenwich) and spoke to key stakeholders about the to-date effectiveness of the School Street scheme. The event highlighted a number of lessons learnt from the school's experience of trialling a School Street and the Mayor's School Air Quality Audit Programme.

Key findings from the event included:

- The impact of poor air quality on pupils' asthma – either causing asthma in the first place or exacerbating existing asthma;
- The importance of communicating clearly and early with parents and local residents in anticipating of the School Street scheme;
- The Mayor's School Air Quality Audit Programme allowed the school to share best practice with other schools, through the Air Quality Forum;
- The need for the Mayor to raise awareness of the car scrappage scheme, in order to support Londoners to transition to the new ULEZ; and
- The beginning and end of each school day were noticeably calmer and less stressful as people entered and left the school premises.

The scale of respiratory diseases in London is significant. According to the British Lung Foundation (BLF), there are approximately 508,000 Londoners who are being treated for asthma and 117,000 Londoners being treated for chronic obstructive pulmonary disease (COPD).[76] Air pollution is known to have a pervasive effect on the health and lives of those living with asthma and COPD, with over 80 per cent of those with a lung condition indicating that air pollution affected their health and wellbeing, according to a recent BLF survey.

In a survey we completed recently with YouGov, we found that 63% of people with a lung condition can feel out of breath and 53% of people have increased coughing due to high levels of air pollution … we found that 7% of lung patients have reported that, on high air pollution days, they had either been hospitalised or had to seek some form of emergency medical care".

Zak Bond, Policy and Public Affairs Officer
Asthma UK and British Lung Foundation Partnership

At the 17 November 2020 Environment Committee meeting, the Committee heard evidence

[76] London's population is based on the most recently available statistics: 2018 population projections.

from Asthma UK and British Lung Foundation Partnership's Zak Bond, who gave evidence on the impact of air pollution exposure on respiratory problems. In his evidence, Zak cited the account of someone who lived with asthma:

> *"In February 2019 I had the asthma attack from hell and was rushed into hospital. For the first time, I was in the resus ward. I feared I would not be going home. I live in fear of it happening again. Will it be worse than the one before? I have lost my confidence. Leaving the house is a hard choice every day because I know as soon as I step out of my front door, I am being forced to breathe dirty air."*[77]

A 2019 study by King's College London and Imperial College London found that, between 2014-16, approximately a quarter of the 4,000 Londoners who had been hospitalised because air pollution exacerbated their asthma or other lung conditions were children under the age of 14. For the same period, air pollution accounted for nearly 10 per cent of total asthma admissions for children.

Given the strong evidence of the health impacts of exposure to air pollution on young people, it is vital that the Mayor invests in a targeted communications campaign to explain air pollution, its sources and impacts on Londoners, in particular those groups most vulnerable to its effects.

Other groups, such as those Londoners over the age of 65, may also be disproportionately impacted by poor air quality in the capital. During the same research period, two Londoners aged 65+ were hospitalised every day due to asthma or COPD, exacerbated by air pollution.[78]

Ahead of any campaign, the Mayor should survey a baseline of Londoners' awareness of the issue so that we can measure the impact of the campaign.

At a more local level, in July 2020, Guy's and St Thomas's Charity announced funding for a Mums For Lungs air quality campaign in Lambeth and Southwark.[79] The project, which will run from July 2020 to December 2021, will cover the cost of School Streets initiatives in Lambeth and support the development of other initiatives around schools. A key element of the project will be to raise awareness of the issue of air pollution at schools, in particular those schools most affected by poor air quality. If successful, it will be important that similar initiatives across London are developed.

Since COVID-19

[77] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[78] Mayor of London, *Press Release, Thousands of COPD and asthma hospitalisations due to London's poor air*, 5 April 2019
[79] Guy's and St Thomas' Charity, *Funding for community activists campaigning for cleaner air across London*, July 2020

Through the investigation, the Committee has looked closely at the relationship between exposure to air pollution and the vulnerability to COVID-19. Clearly, there is limited empirical research on the causes and effects of COVID-19, given its relatively recent existence, but the Committee has been keen to understand what the initial research suggests about the potential links between the two issues.

The Committee is deeply concerned that the emerging research suggests that long-term exposure to air pollution can make Londoners more susceptible and vulnerable to COVID-19. Londoners exposed to air pollution on a regular basis already suffer from a litany of physical health conditions, but recent studies suggest the list could extend to vulnerability to the Coronavirus.

Initial research emerging from the pandemic drew links between air pollution and *"significantly"* higher rates of death to COVID-19.[80] More recent analysis has found that long-term exposure to fine particulate matter could increase the risk of contracting and dying from COVID-19 by up to 6 per cent.[81] The study analysed over 46,000 COVID-19 related deaths in England and identified that a small increase in people's exposure to pollution over the previous decade may increase the mortality rate. Furthermore, American research between January and August 2020 concluded that exposure to air pollution may influence the severity of COVID-19 illness and increase the likelihood of death from the virus. The research found that, during the eight-month period, *"decreases in contemporaneous exposure to fine particle air pollution were linked to decreases in confirmed COVID-19 cases and decreases in mortality"*.[82]

At the 17 November 2020 Environment Committee, the Committee heard evidence from Dr Mudway on the robustness of the research to date. Dr Mudway referred to *"the best study in this area"*, which had been peer reviewed and had been published by Harvard University. The study showed that, during *"peak episodes"* of air pollution, there is an approximately 11 per cent increase in COVID-19 deaths per one microgram per metre cubed increment in PM2.5. Dr Mudway added:

[80] The Guardian, *Air pollution linked to far higher Covid-19 death rates, study finds*, 7 April 2020
[81] Office for National Statistics, *Does exposure to air pollution increase the risk of dying from the coronavirus (COVID-19)?*, 13 August 2020
[82] International Center for Public Policy, *COVID-19 Mortality and Contemporaneous Air Pollution*, October 2020

What it is saying is that populations who have lived in areas for a long duration of time are carrying that vulnerability from their long-term exposure to air pollution. Air pollution has made them vulnerable and susceptible to a whole host of things, and COVID-19 has come along … and delivered the final coupe de grâce, so to speak".

Dr Ian Mudway, Senior Lecturer in Public Health
Imperial College London

Given the relatively recent existence and evolving nature of the virus, the Committee hesitates to draw firm conclusions about the relationship between air pollution exposure and vulnerability to COVID-19 before the science is clearer than a single study. However, the Committee calls on the Mayor to take account of the growing research in this area when he considers the wider evidence of air pollution's impact on Londoners' health. Specifically, the Mayor should build on existing City Hall-commissioned air quality research and further explore the relationship through new research, which can inform the work of the Green New Deal Recovery Mission and London's Recovery Board. The emerging links should be deeply concerning to Londoners and could reinforce the rationale for tackling air pollution in the capital.[83]

[83] GLA, Press Release, Study shows Mayor's policies will increase life expectancy of children, 25 January 2021

Chapter three – Tackling air pollution at schools

Recommendation 4

The Mayor should resource the London Schools Pollution Helpdesk properly and consider expanding its remit to support London care homes and hospitals as the COVID-19 recovery gets underway.[84]

Recommendation 5

The Mayor should conduct a review of the Schools and Nurseries Air Quality Audit Programme by October 2021. The review's aim should be to increase the uptake across the capital, with a target for 100 additional enrolled schools or nurseries on the Programme by December 2021.

Recommendation 6

The Mayor should confirm when he expects the air quality at all schools to be brought within the legal NO_2 limit. This includes the 14 schools in London in areas at or exceeding the legal NO_2 limit. If this is not within a year, he should outline an action plan to do so.

Recommendation 7

The voices of pupils, teachers, parents and local residents should be heard as part of the School Street Evaluation Project. As part of this, the Mayor and TfL should fully engage with schools and London boroughs.

[84] The Committee recognises that the date may be impacted in the event of a further resurgence in COVID-19.

The Mayor's response to date

Progress to reduce the number of schools in areas with illegal NO_2 levels

The deadline for meeting the legal limits for air pollution from NO2 was 2010 but was not met for many sites within London. The Mayor's recent *Air Quality in London 2016-2020* report showed that there have now been significant improvements in air pollution levels, particularly NO_2 levels, across London. Similarly, there have been significant improvements in air quality around London schools, as the number of state primary and secondary schools in areas exceeding the NO_2 legal limit fell from 455 in 2016 to 14 in 2019.[85]

However, the findings show that 14 London schools (as part of a wider total of 34 London educational establishments) are still in areas where NO_2 levels are at or exceed the legal limit. It is concerning that the Mayor's air quality initiatives have not yet reduced exposure to air pollution levels to within legal limits across all schools in the capital.

Therefore, the Committee calls on the Mayor to confirm when he expects existing plans to address the air pollution levels at the 14 schools of concern.

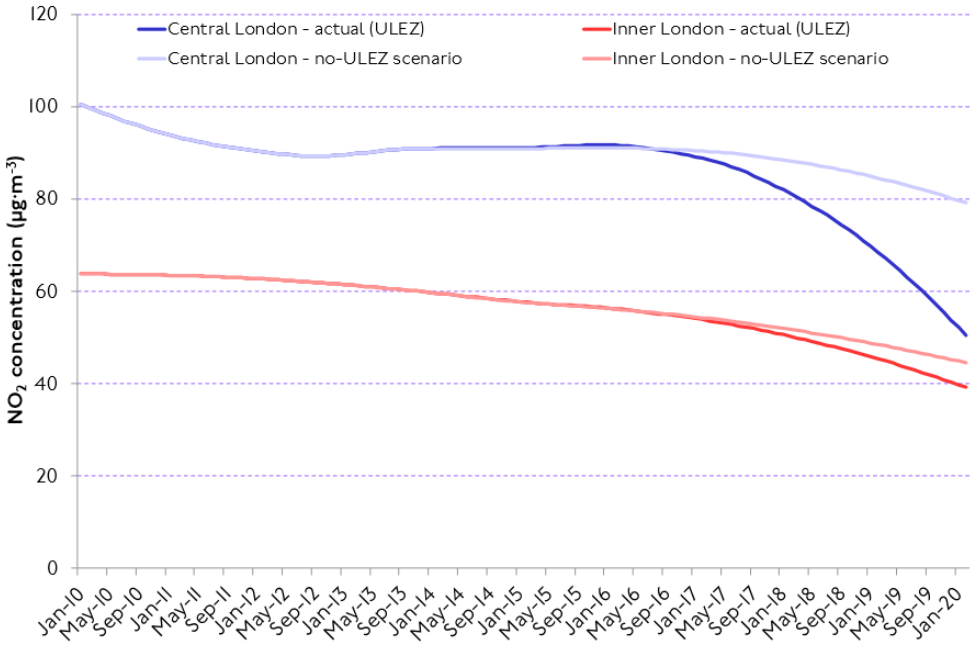
Overarching Policies – Ultra-Low Emission Zone (ULEZ)

The ULEZ, which was launched in April 2019, operates 24 hours a day in the existing central London Congestion Charge Zone (CCZ). In order to avoid paying a daily charge to drive in the ULEZ area, vehicles must meet strict emission standards. Prior to the ULEZ's launch, the Mayor introduced the T-Charge (Toxicity Charge) in February 2017, which served as a steppingstone for the ULEZ.[86]

The ULEZ has been one of the biggest single contributors to reductions in NO_2 levels over recent years. Figure 8 shows that the monthly average of NO_2 concentrations at roadside locations in the central London CCZ fell by 44 per cent between February 2017 and 2020.[87] [88]

[85] Mayor of London, *Air Quality in London 2016-20*, October 2020
[86] TfL, *Travel in London – Report 13*, 2020
[87] Mayor of London, *Air Quality in London 2016-20*, October 2020
[88] TfL, *Travel in London – Report 13*, 2020

Figure 13: Monthly average NO_2 concentrations at roadside locations in London[89]



The Committee welcomes the ULEZ's impact on air pollution levels, particularly in central London, where NO_2 levels have fallen considerably since its launch. The Committee also recognises the benefit of large-scale, area-based initiatives that complement specific initiatives at particular locations. The Mayor's extended ULEZ is due to come into force in October 2021. The Committee welcomes this proposal, which will support reductions in pollution in areas currently not covered by the ULEZ.[90]

However, the Committee notes that as a one-off daily fee the central London ULEZ, though it has been found to cause initial reductions in overall traffic, does not directly incentivise a reduction in the distance travelled by vehicles in central London, which is a key contributor to air pollution, particularly PM2.5 from tyre wear.[91]

Over the longer-term, TfL and the Mayor have already indicated they are willing to explore new forms of road pricing and it is important that reducing air pollution is considered as one of the goals of such work.[92]

[89] TfL, City Planning, based on London Air Quality Network.
[90] It should be noted that the Conservative Group dissents from this point.
[91] Mayor of London, *Central London ULEZ six month report*, 21 October 2019
[92] TfL, *Financial Sustainability Plan*, 11 January 2021

Schools and Nurseries Air Quality Audit Programme

In 2018, the Mayor developed a Schools and Nurseries Air Quality Audit Programme, which initially audited 50 primary schools across 23 London boroughs to produce recommendations designed to reduce emissions around schools and reduce school children's exposure to pollutants.[93] Under the programme, the Mayor allocated £10,000 to each school, which was match-funded by the school or relevant London borough.

The programme has since been rolled out to 20 nurseries, with £4,500 allocated to each nursery and air filtration equipment provided to identify any reductions in indoor air pollution.[94] Data on the initial 70 schemes, including their location, is publicly available at a pan-London level.

As part of the audit programme, a toolkit was developed for schools to use to identify and address a range of issues contributing to air pollution in and around their buildings. Examples of recommendations to reduce emissions and exposure included:

- Reducing emissions from boilers, kitchens and other sources;
- Encouraging students to walk and cycle to school along less polluted routes; and
- Introducing green infrastructure, such as 'barrier bushes' along adjacent roads to filter emissions.[95]

Whilst the Committee welcomes the Mayor's commitment to audit air quality at schools and nurseries, the Committee is concerned that the audit programme has not had the anticipated impact. Specifically, the Committee has received feedback from 15 London boroughs raising concerns with the programme. A summary of the feedback is included later in the report. The Committee is concerned that the design, implementation and resourcing of the programme has led to too few schools and nurseries audited over the last two years. At the 17 November 2020 Environment Committee meeting, the Committee heard from Oliver Lord, the Environmental Defense Fund's Head of Policy and Campaigns, who reflected on the drawbacks of the Mayor's approach to the audit programme:

> *"Unfortunately, with the way it [the Air Quality Audit Programme] was resourced – and I understand there are priorities that need to be made – only 50 schools benefitted from that programme."*
>
> **Oliver Lord**
> **Head of Policy and Campaigns, Environmental Defense Fund**

[93] Mayor of London, *The Mayor's School Air Quality Audit Programme*, May 2018
[94] Mayor of London, *The Mayor's nursery air quality audit programme*, May 2018
[95] Mayor of London, *Toolkit of Measures to Improve Air Quality at Schools*, May 2018

At the 17 November 2020 Environment Committee meeting, the GLA's Head of Air Quality noted that, whilst "we think it was a successful programme … we definitely learnt from that experience". Specifically, the Head of Air Quality stated that "what we recognised is that we needed to help many more schools to take action".[96]

In November 2020, the Mayor announced that a new London Schools Pollution Helpdesk would be established in early 2021 to *"support schools London-wide to deliver air quality audits"* and would *"prioritise the remaining schools in areas of London still exceeding or nearly exceeding legal pollution levels"*.[97]

The Committee welcomes the announcement of additional resources to support the audit programme, but the Committee is concerned that it will not have the 'teeth' to properly assist schools to use the audit toolkit. At present, there is limited detail information about the scope and remit of the Helpdesk, what level of resourcing will be provided, and how its key objectives will be determined.

At the 17 November 2020 Environment Committee meeting, the Committee heard concerns from the third sector that the Helpdesk risked becoming a reactive initiative that would not provide the support needed for schools.

> *"I like this idea of a helpdesk, but what schools most need more than a helpdesk is a partner. It is going to them with a package of support rather than thinking that thousands of schools will ring up a helpdesk when, to be honest, clean air is not on the agenda of most governing bodies."*
>
> **Larissa Lockwood**
> **Clean Air Director, Global Action Plan**

At the same meeting, the Committee heard that it was the GLA's intention for the Helpdesk to be "combined with much more targeted outreach". The Committee welcomes this indication but would urge the Mayor to set out a clear plan of outreach over the next year, with robust targets for additional audits completed at London schools. The Committee also urges the Mayor to work closely with schools to develop the outreach plan, as their feedback on the programme will be instrumental to learning lessons of the Mayor's approach to date.

[96] London Assembly, *17 November 2020 Environment Committee meeting minutes*, 17 November 2020
[97] Mayor of London, *Press Release, Mayor unveils plan for further reduction in pollution at schools*, 10 November 2020

Streetspace and School Streets

In response to COVID-19, the Mayor has increased significantly the number of Streetspace for London (Streetspace) programmes and School Streets, as a means to *"build back better"* from the pandemic.[98]

Streetspace includes a number of measures, such as additional cycle lanes and routes, a new walking, cycling and bus-only corridor, widened pavements and new low-traffic corridors.[99] The Mayor allocated over £3 million to 430 schools (around an average of £7,000 per school) as part of the School Streets scheme, where roads surrounding schools are closed to motor traffic at drop-off and pick-up times.[100]

What do London boroughs think?

As part of our investigation, the Committee asked London boroughs to share their experiences of working with the Mayor on school-based air quality initiatives. In total, the Committee heard from 15 London boroughs. The Committee has summarised the key themes that emerged from their feedback:

Air Quality Audit Programme

- The Air Quality Audit Programme achieved a number of positive outcomes for schools. For example, in LB Richmond, schools encouraged walking, erected green screens, reviewed boilers and raised awareness of the issue;
- Nine of the 15 boroughs responding surveyed had participated in the schools and nurseries air quality audit programme;
- There were concerns regarding the methodology underpinning the GLA's work to determine the most polluted schools, as the audit was launched in 2017 but was based on 2013 data. For example, LB Merton stated that it had identified, through its own monitoring, that five schools were highly polluted. However, these schools had not been identified as highly polluted from the GLA's air pollution modelling. In LB Hackney, resources were diverted from the most polluted schools to better performing schools, as the outdated data that underpinned the GLA's methodology identified the wrong schools;
- Some boroughs struggled to find match funding for the air quality audit programme, and other boroughs identified a lack of funding to replicate the programme in other schools;
- Some boroughs identified a lack of guidance from the GLA and TfL regarding the implementation of the air quality audit toolkit, or a lack of wider coordination of the delivery of the audit's recommendations; and
- Some boroughs found the bidding process labour intensive with very little feedback provided by the GLA.

[98] Mayor of London, *Air Quality in London 2016-20*, October 2020
[99] TfL, *Streetspace for London*
[100] TfL, *Press release, TfL urges children to walk, cycle and scoot to school to help children safely return to the classroom*, August 2020

School Streets

- 13 of the 15 boroughs responding had at least one School Street in the borough. Of those that had a School Street, the number of schemes in each borough ranged from four to 14;
- The distribution of School Streets is mixed across London – and boroughs are at different stages in the implementation of the programme. For example, there are 14 School Streets in LB Richmond, whereas there are only four School Streets being piloted in LB Kingston;
- Where School Streets have been introduced in boroughs, it has generally been welcomed by schools, including headteachers, senior staff and parents, though some boroughs noted that individual cases had been contentious; and
- Of those boroughs that raised issues with the School Streets, the need to enforce the programme (and a lack of school resource to do so) was identified as a key request, in order to ensure that drivers adhered to the conditions of the programme.

Wider air quality activity

- 73 per cent of the boroughs responding provided evidence of steps being taken to deliver other air quality measures; and
- There is significant variance in the level of additional air quality activity taking place within different boroughs. For example, there have been several campaigns to reduce 'idling' around schools. In the City of London, there has been significant investment in air quality activity, underpinned by an Air Quality strategy.

Role of the Mayor and GLA

- The Mayor's initiatives to date have enabled London boroughs to work together to tackle cross-border air pollution issues. For example, the *Zero Emissions Network,* a tri-borough partnership between LB Hackney, LB Tower Hamlets and LB Islington allowed collaboration and continuity across three cycle projects;
- Some pan-London air quality initiatives have felt too much like a blanket approach, and more localised, targeted measures are required; and
- There were concerns regarding the long-term funding security for the partnerships, as many council employees left their positions after funding cycles ended.

Chapter four – Taking further action

Recommendation 8

The Mayor should collate best practice in tackling and monitoring air pollution in the context of COVID-19 and share it by December 2021. National and international best practice should help policy makers, at all levels of government, identify further action and learn from measures taken by other cities over 2020 and 2021.

Recommendation 9

When recovery gets underway, the Mayor should extend the Air Quality Audit Programme to London care homes and hospitals, working in partnership with London Boroughs to identify and work with the sites on the ground. Six months into this programme, the Mayor should review his engagement and return to the Committee.[101]

Recommendation 10

The Mayor should review the impact of London's Red Route network on air pollution at schools by December 2021.

[101] The Committee recognises that the date may be impacted in the event of a further resurgence in COVID-19.

Background

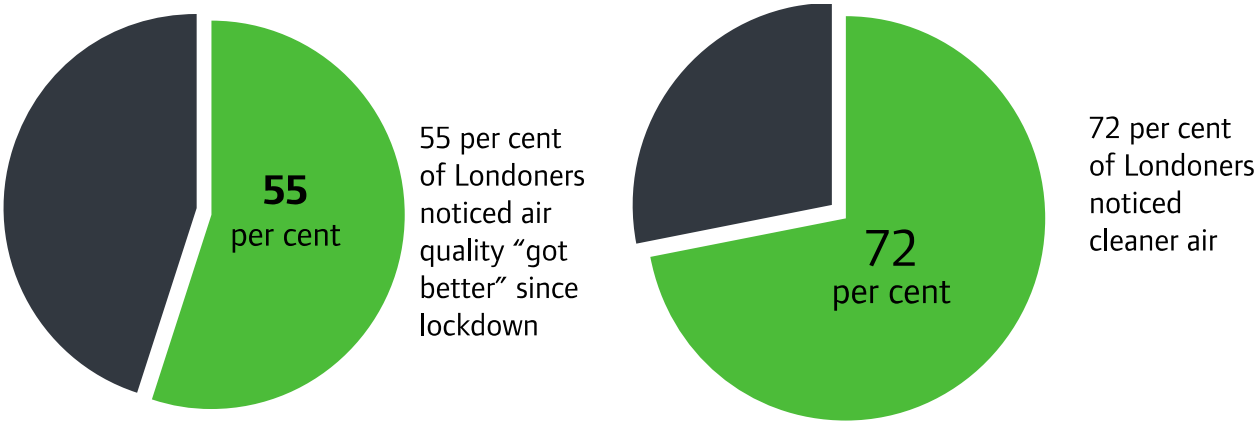
Many of the Mayor's air quality initiatives have now been in place in London for several years.[102] The Mayor's most recent air quality report shows that, over the last four years, the initiatives have contributed to a reduction in emissions across the capital, but the Committee is clear that there is room for further progress.

The COVID-19 pandemic and the associated events of the last six months have created opportunities for leaders and policy-shapers around the world to think more radically about their response to air pollution. As a Committee, we are keen to harness the opportunity to be bolder and more creative in the way we tackle air pollution.

In considering what further air quality action could be taken by the Mayor, the Committee has looked at the scope for additional measures at schools to complement or replace the existing initiatives at school settings. The Committee has also explored the applicability of existing and new measures at other vulnerable sites in the capital, as the Committee recognises that other vulnerable groups would benefit from targeted air pollution protection. More generally, the Committee has looked at whether the Mayor should introduce innovative, new measures to reduce emissions, such as PM2.5, where there has been limited progress to date.

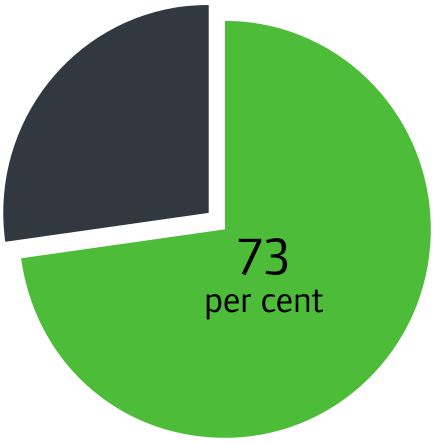
The case for further action since COVID-19

Emerging intelligence suggests that Londoners' attitudes towards air pollution and measures to tackle it have changed since the outbreak of the pandemic. For example, recent polling, commissioned by Urban Health Foundation, a Guy's and St Thomas' Charity, suggests Londoners have noticed a difference in air quality since the pandemic.



The survey showed that 72 per cent of Londoners' reported noticing cleaner air, and 73 per cent said they were happier as a result of not having to commute during rush hour.[103] Similarly, the Mayor's own commissioned polling, through an April 2020 YouGov survey, found that 55 per cent of Londoners said they had noticed air quality "get better" since lockdown.[104]

[102] Please see Appendix 2 for an overview of the Mayor's key air quality initiatives.
[103] Smart Transport, *London in lockdown sees air quality improve by up to 50 per cent*, 8 July 2020
[104] Greater London Authority, *YouGov / Mayor of London Survey*, April 2020



73 per cent of Londoners were happier as a result of not having to commute during rush hour

Specifically, during London's first lockdown, research conducted by Global Action Plan and Urban Health Foundation found that a significantly higher proportion of people noticed an improvement in air quality in London than in the UK as a whole.[105][106]

The research also identified that people were concerned that air pollution would get worse after lockdown – and that it would worsen their own health as well as the health of their children and elderly relatives. For example, one in three of the people surveyed were more concerned about the impact of air pollution on their family's health during lockdown than they were before the outbreak of the pandemic.[107]

The BLF's recent report found that one in four asthma suffers noticed their symptoms improve during lockdown.[108] Of those surveyed, one Londoner said:

> *"When leaving the house [before] I couldn't breathe, the doctor says I should use my inhaler every four hours, but since I am in lockdown I use it once a day."*
>
> **Anonymous response to British Lung Foundation Survey**

COVID-19 has forced comparable major international cities to rethink the way they configure their transport networks and tackle associated air pollution. For example, in Milan, officials are creating 35 kilometres of new cycle routes across the city, widening pavements for pedestrians and reducing parking spaces.[109] In Barcelona, plans are in place to add 30,000 additional square metres to its pedestrianised networks and 13 miles to its cycle network.[110] Other cities around the world are implementing similar measures.[111]

There are opportunities to learn from the experiences of comparable cities, where there have been similar efforts to tackle air pollution post COVID-19. Therefore, the Committee calls on the Mayor to share and learn from best practice across the world, to ensure that Londoners are not missing out on further action that has worked in other cities.

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[105] 72% of those surveyed in London noticed an improvement in air quality during the first lockdown, compared with 59% of those surveyed in the UK as a whole.
[106] Global Action Plan, *Build Back Cleaner Air: COVID-19 and Air Pollution*, July 2020
[107] Global Action Plan and Guy's and St Thomas' Charity, *Survey*
[108] British Lung Foundation, *Nearly 2 million people with lung conditions notice improved symptoms as a result of drop in air pollution*, 4 June 2020
[109] World Economic Forum, *How the COVID-19 crisis inspired this major Italian city to transform its polluted streets – for good*, 24 April 2020
[110] La Vanguardia, *Barcelona to turn car spaces into expanded sidewalks and bike lanes*, 25 April 2020
[111] The Guardian, *City leaders aim to shape green recovery from coronavirus crisis*, 1 May 2020

Applying existing measures at other vulnerable sites

Although the Committee has raised concerns about the Mayor's Air Quality Audit Programme, we believe with the appropriate resources, strategy and monitoring framework, it can be a key tool to reduce air pollution at specific locations.

However, the Committee does not think the ambition of the Programme should stop at schools and nurseries. The COVID-19 pandemic has shone a light on other key worker sites, such as care homes and hospitals, where some of the most vulnerable Londoners visit.

The Committee recognises the current challenges posed to hospitals and care homes during COVID-19. In this context, it is clear that any Mayoral support at these sites will need to be cognisant and sensitive of the emerging pressures when London recovers from the pandemic.

The Committee has noted that when the Programme was initially launched it was anticipated that the air quality audit toolkit could be used by hospitals. At the 17 November 2020 Environment Committee meeting, the Committee asked the GLA whether any action had been taken to encourage adoption at such sites. Although it was indicated that the GLA was supporting Global Action Plan to develop its Hospital Framework, it was not indicated that the Mayor had enrolled any London hospital in the air quality audit toolkit. The Committee also heard that the GLA had chosen to prioritise schools *"while we were waiting for those strategic London-wide measures like the ULEZ to be implemented"*.

Therefore, the Committee urges the Mayor to engage with London care homes and hospitals and enrol them in the programme when recovery gets underway and the pressure on hospitals has reduced. This should improve awareness of the Air Quality Audit Programme and ensure there is a framework through which care homes and hospitals can access support to implement the toolkit.

The Committee urges the Mayor to review the impact of his outreach to sites across London and – depending on the level of participation – consider expanding his Schools Pollution Helpdesk to participating care homes and hospitals. The Helpdesk will need the necessary funding and resources to properly support schools and other vulnerable sites.

Implementing further air quality action at schools

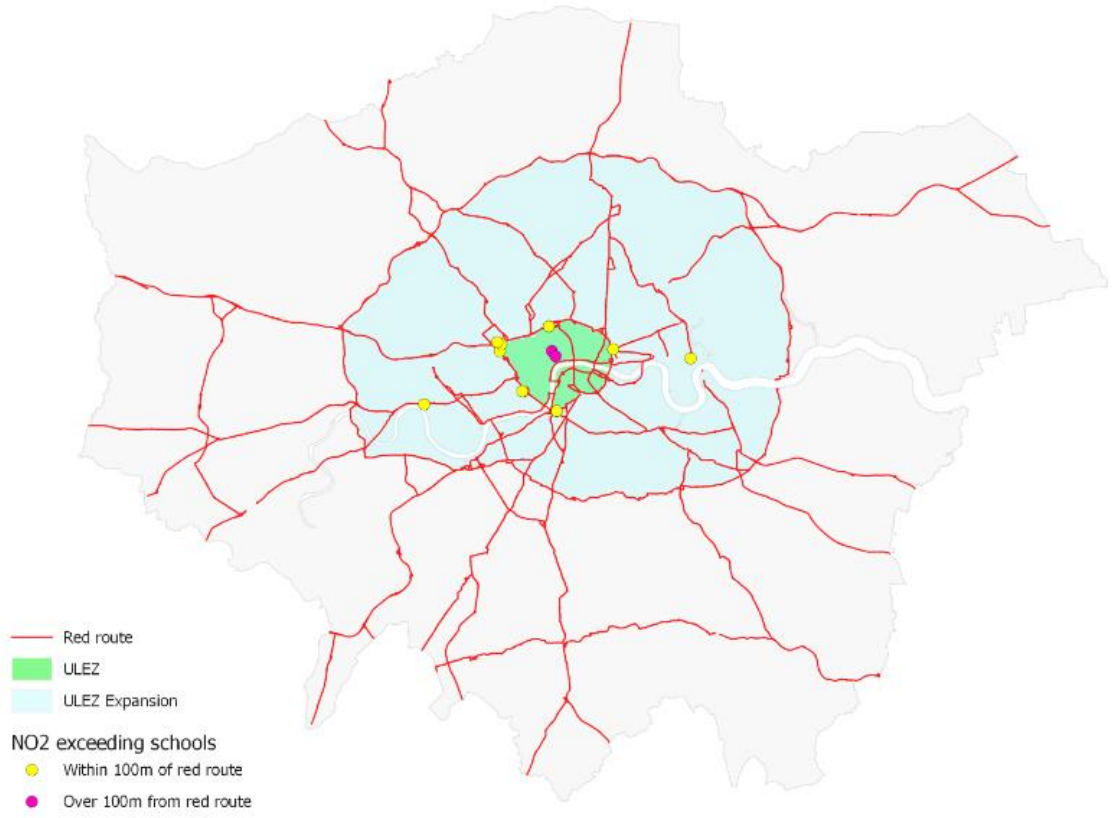
Reducing air pollution at and immediately around schools is vital. However, the Mayor should also consider tackling pollution in the wider neighbourhoods, in which schools are situated. Taking this approach would better reflect the drivers of air pollution levels in different areas and respond to the issue in a more effective way. For example, the London Borough of Southwark is currently developing School Superzones to encourage residents and businesses in the local area surrounding a school to reduce their household and commercial emissions.

As part of the Committee's call on the Mayor to identify London-specific action to reduce PM2.5 (Recommendation 1), the Mayor should consider plans to create buffer zones around the top 10 per cent of London schools situated in areas with the highest NO_2 levels, where the following measures are explored:

- Work with the local authority to target affected residents and businesses and encourage them to replace their domestic or commercial heating systems;
- Work with the local authority to ban the construction of depots or other industrial sites within the area;
- Target existing boiler retrofit campaigns in all public and private buildings.

The Mayor should also consider the air pollution impact of London's Red Routes on nearby schools. For example, recent analysis has shown that nearly all of those schools situated in areas that still exceed legal NO_2 limits are within 100 metres of London's red routes. It should be noted that the planned extension of the ULEZ may play a role in reducing air pollution at the schools, therefore the Mayor should assess its impact alongside the Red Routes review.

Figure 14: London's Red Routes[112]



At the 17 November 2020 Environment Committee meeting, the Committee heard about the air pollution impacts for schools situated near to London's Red Routes. EDF's Oliver Lord described a link between proximity to red routes and the highest levels of NO_2 at London schools. More widely, there is a significant proportion of primary schools situated within 100 metres of London's Red Routes, with some London boroughs accounting for nearly one quarter of their primary schools.

"… Nine of the 11 schools that are currently in areas of illegal air quality are within 100 metres of the Red Routes network."

Oliver Lord, Head of Policy and Campaigns, Environmental Defense Fund Europe

The Mayor should conduct a fundamental review of the Red Route network to consider the health impacts on vulnerable Londoners. The Committee has proposed the review in recognition that London's transport system and patterns have changed significantly since it was introduced nearly 30 years ago, and the Mayor has considerable powers to effect change, as the network is owned and managed by TfL.

[112] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF), based on Breathe London data. See Appendix 1 for EDF analysis.

Figure 15: Average total NOx concentrations at London primary schools within and over 100 metres of a Red Route[113]

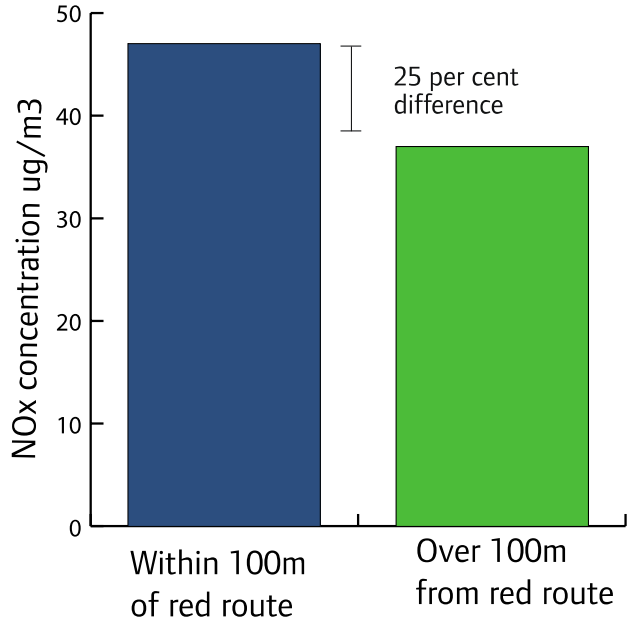


Figure 15 shows that, on average, the total NOx concentrations at London primary schools within 100 metres of a Red Route are 25 per cent higher than those over 100 metres from a Red Route.

Figure 16: Proportion of London primary schools near Red Routes, by London borough

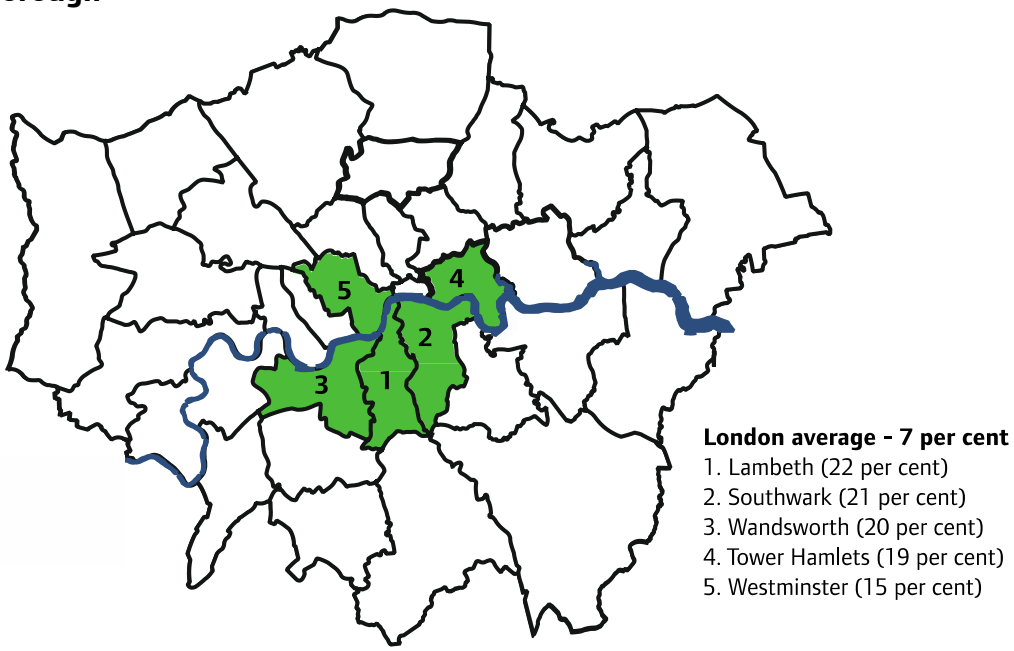


Figure 16 shows the five London boroughs with the greatest proportion of primary schools within 100 metres of a Red Route.

[113] The figure is a visualisation of analysis produced by Environmental Defense Fund (EDF). See Appendix 1 for EDF analysis.

Acknowledgements

The Committee would like to thank all the individuals and organisations that contributed to the investigation, including the guests who gave live evidence at the Committee's 17 November 2020 meeting.

In particular, the Committee would like to thank Environment Defense Fund Europe for sharing its new research, which is contained in this report. The research will assist policy makers in understanding what further action can be taken to reduce air pollution in London.

A full list of the individuals and organisations that contributed to the investigation is found below:

- *Dr Ian Mudway, Senior Lecturer, School of Public Health, Imperial College London*
- *Dr Larissa Lockwood, Director of Clean Air, Global Action Plan*
- *Oliver Lord, Head of Policy and Campaigns, Environmental Defense Fund*
- *Zak Bond, Policy and Public Affairs Officer, British Lung Foundation*
- *Elliot Treharne, Head of Air Quality, Greater London Authority*
- *Gregory Slater, Senior Data Analyst, Environmental Defense Fund*
- *London Borough of Barking and Dagenham*
- *London Borough of Bromley*
- *London Borough of City of London*
- *London Borough of Enfield*
- *London Borough of Hackney*
- *London Borough of Haringey*
- *London Borough of Havering*
- *London Borough of Islington*
- *London Borough of Kingston-upon-Thames*
- *London Borough of Lambeth*
- *London Borough of Lewisham*
- *London Borough of Merton*
- *London Borough of Richmond-upon-Thames*
- *London Borough of Sutton*
- *London Borough of Tower Hamlets*

Appendices

Appendix 1: Environmental Defense Fund methodology

The Committee is grateful to Environmental Defense Fund (EDF) for its recent air pollution analysis, which has informed the report's findings and recommendations. The analysis below relates directly to the figures used throughout the report.

The data underpinning EDF's analysis was produced by the Breathe London pilot project. The data is publicly available on the Global Clean Air website – including a direct link to the data.

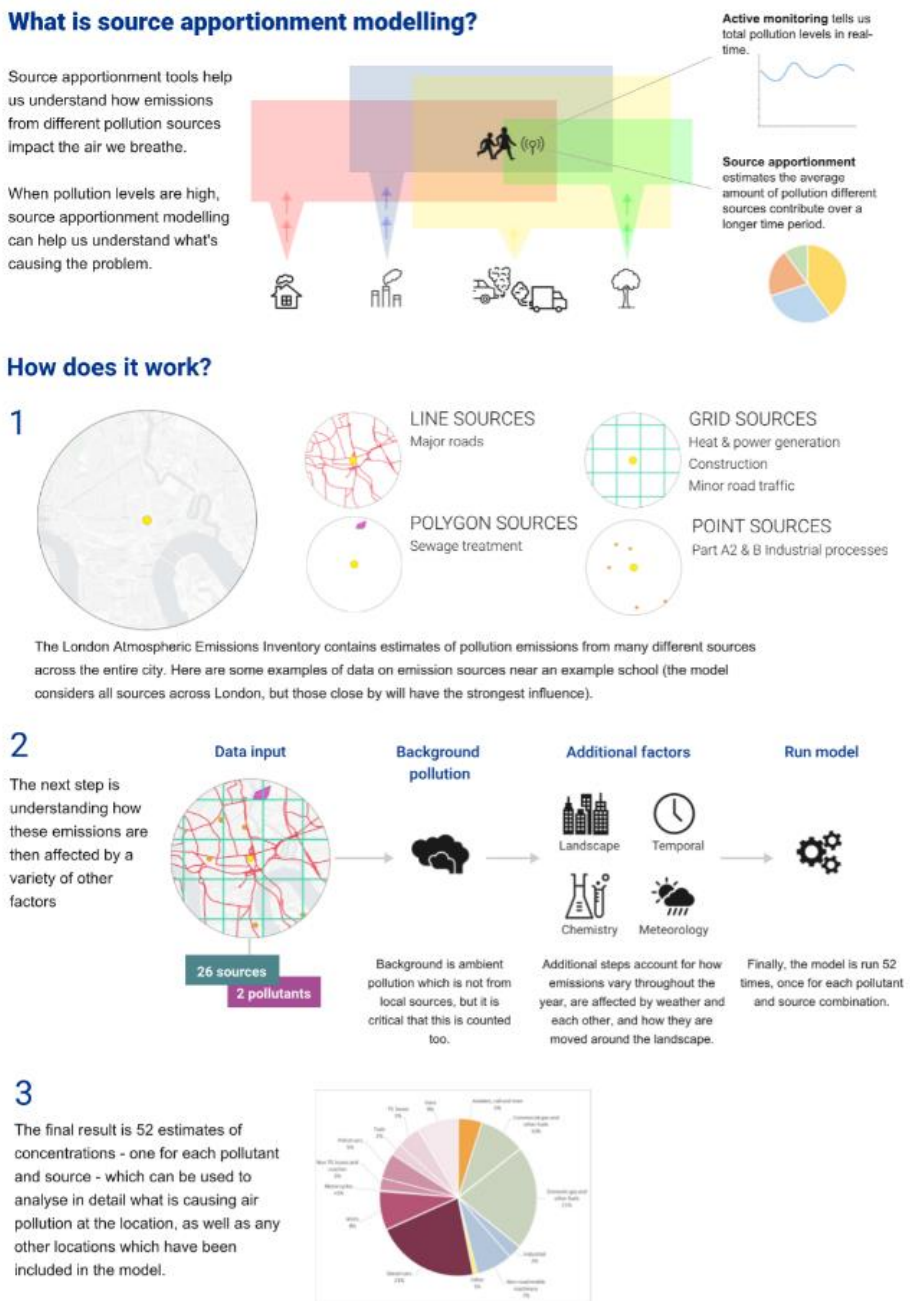


Figure 4

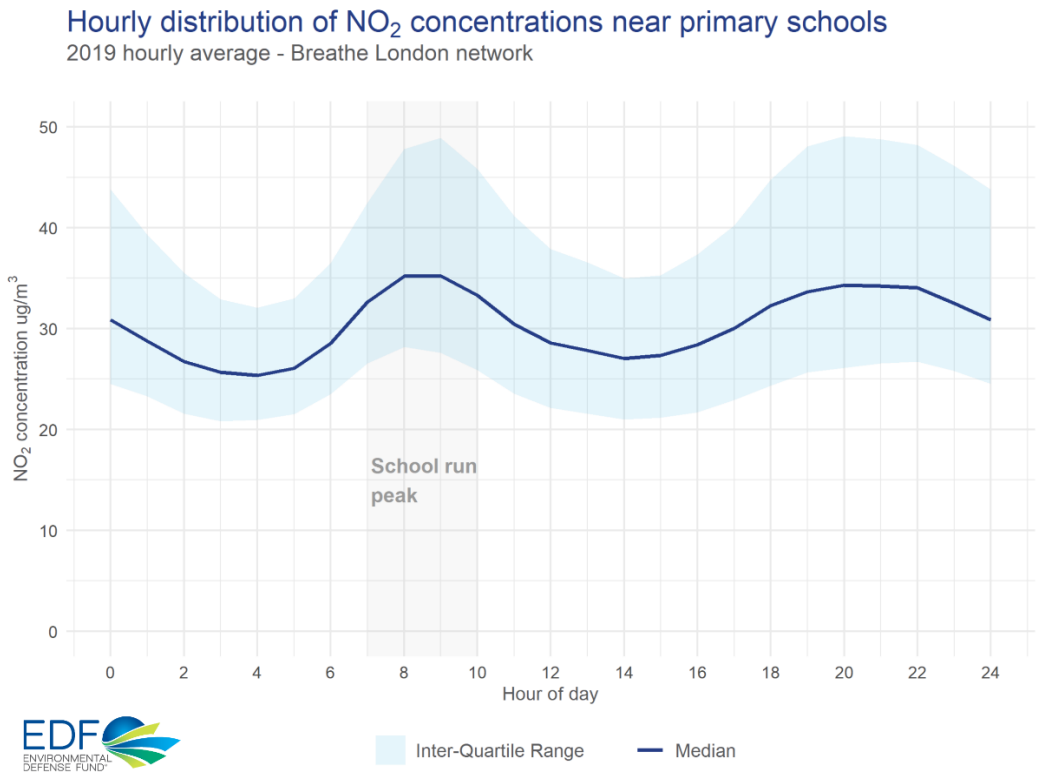


Figure 5

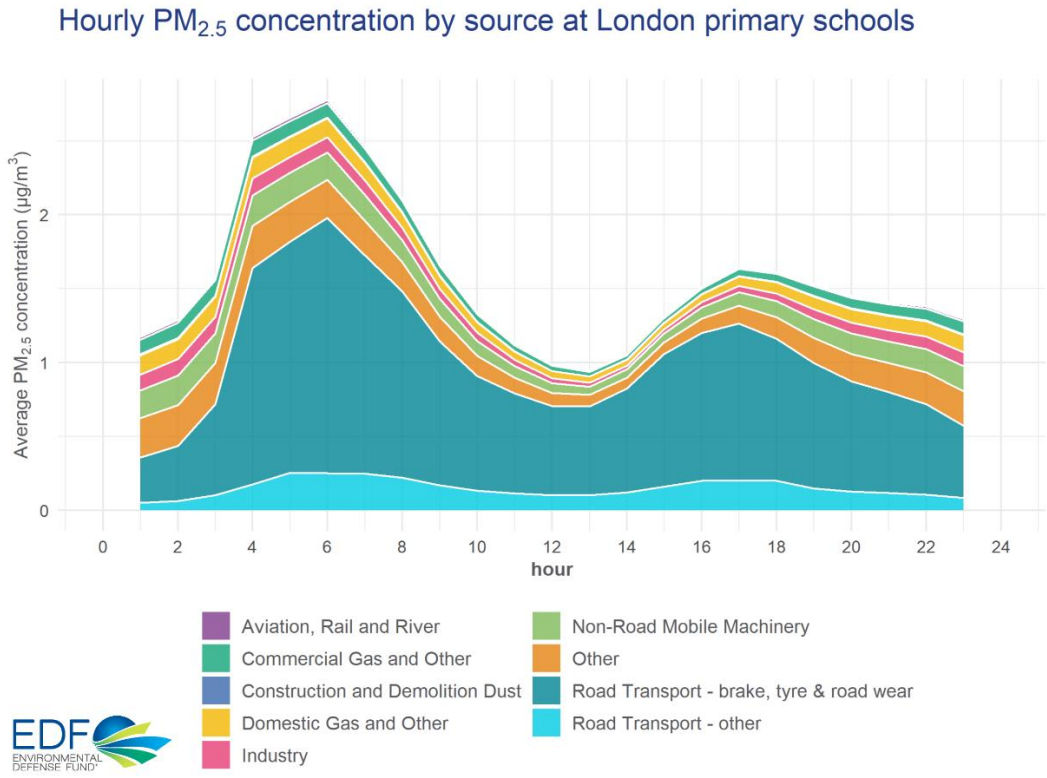


Figure 7

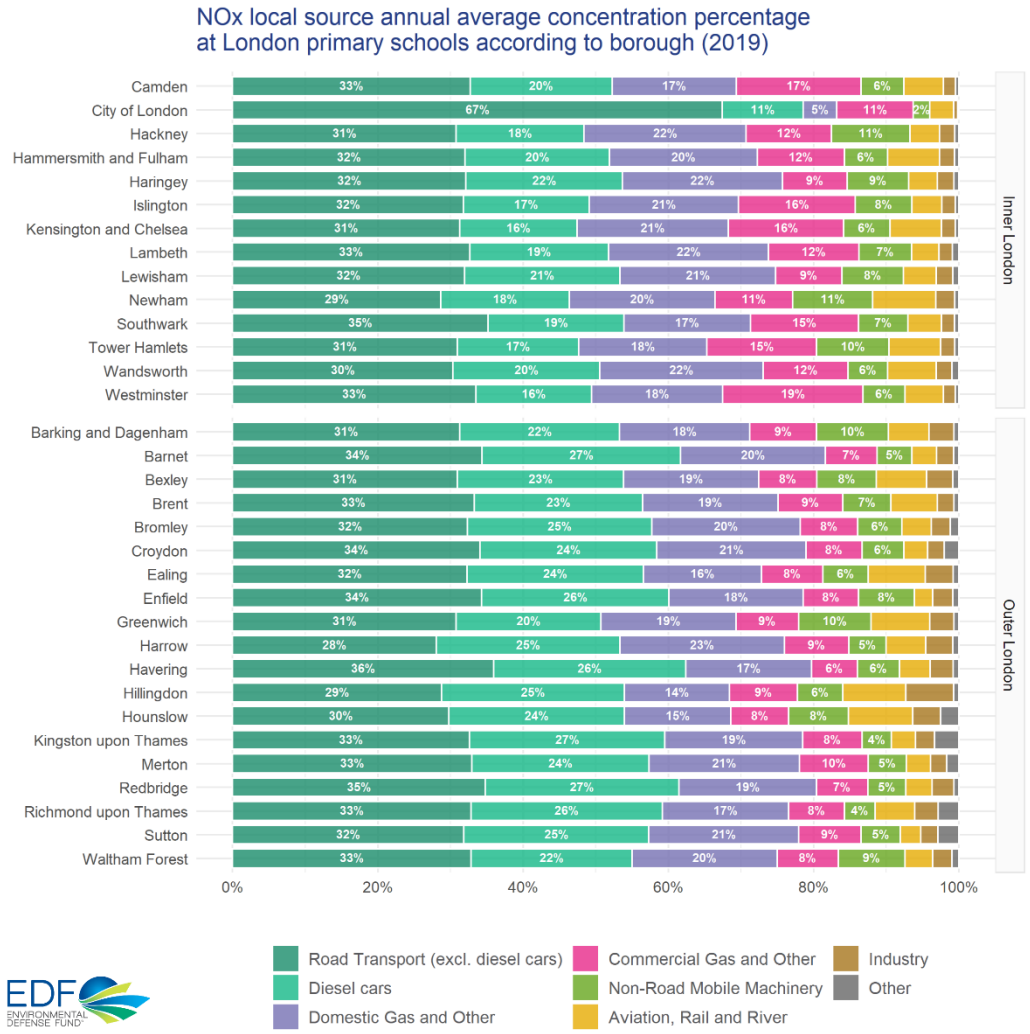


Figure 8

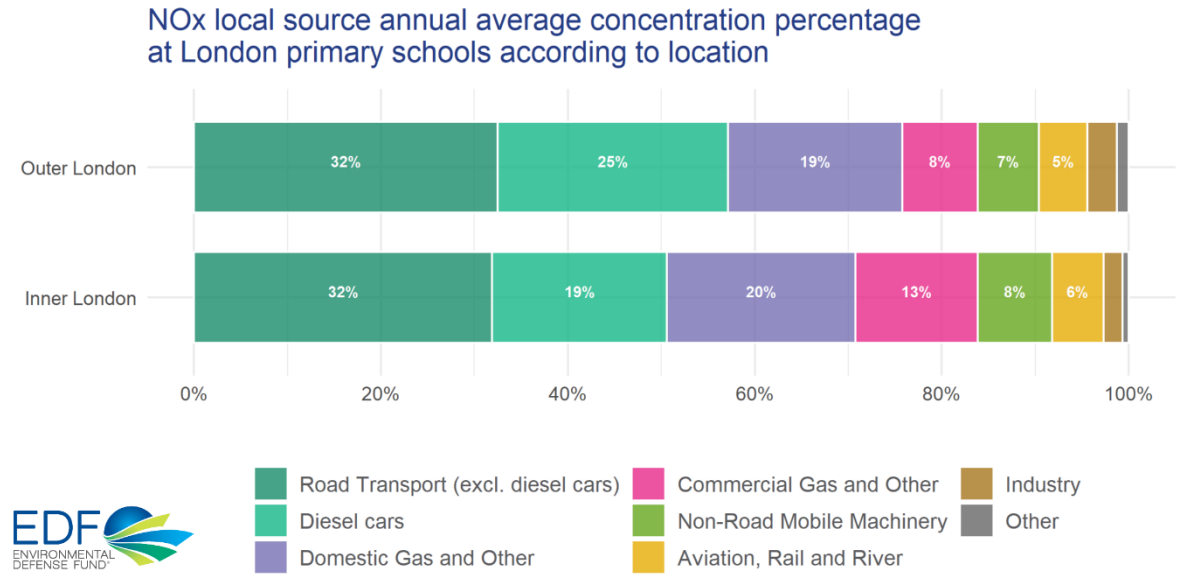


Figure 9

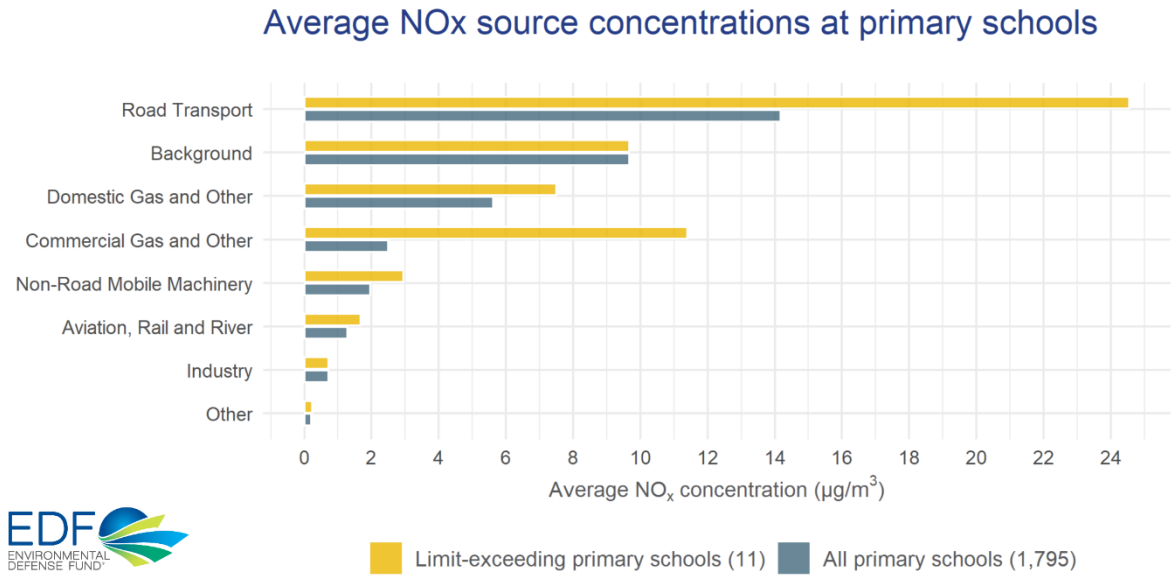

Average NOx source concentrations at primary schools
Road Transport
Background
Domestic Gas and Other
Commercial Gas and Other
Non-Road Mobile Machinery
Aviation, Rail and River
Industry
Other
0
2
4
6
8
10
12
14
16
18
20
22
24
Average NOx concentration (µg/m3)
EDF
ENVIRONMENTAL DEFENSE FUND
Limit-exceeding primary schools (11)
All primary schools (1,795)

Figure 11

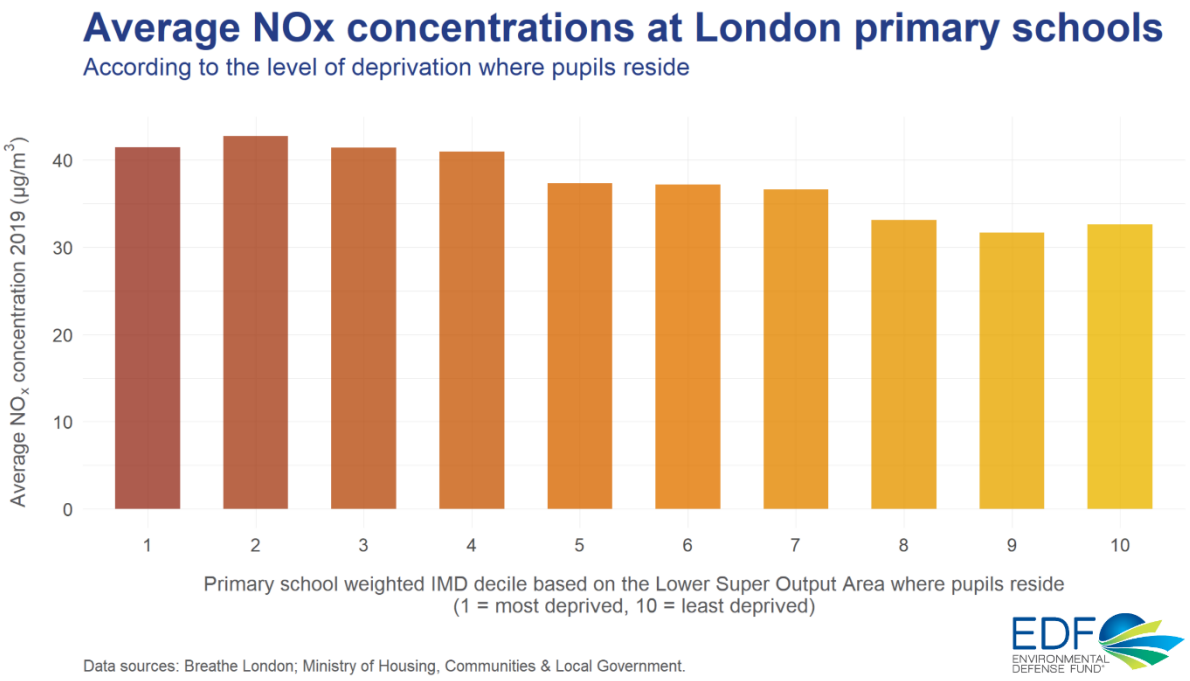

Average NOx concentrations at London primary schools
According to the level of deprivation where pupils reside
Average NOx concentration 2019 (µg/m3)
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
Primary school weighted IMD decile based on the Lower Super Output Area where pupils reside
(1 = most deprived, 10 = least deprived)
Data sources: Breathe London; Ministry of Housing, Communities & Local Government.
EDF
ENVIRONMENTAL DEFENSE FUND

Figure 12

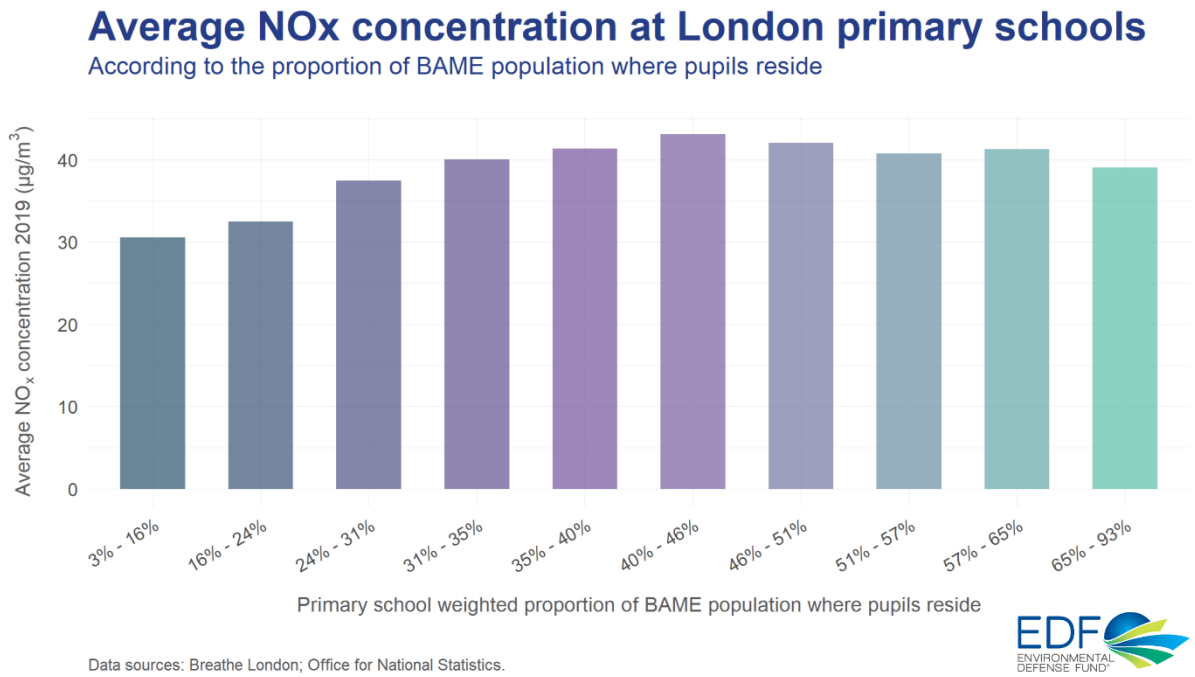


Figure 15

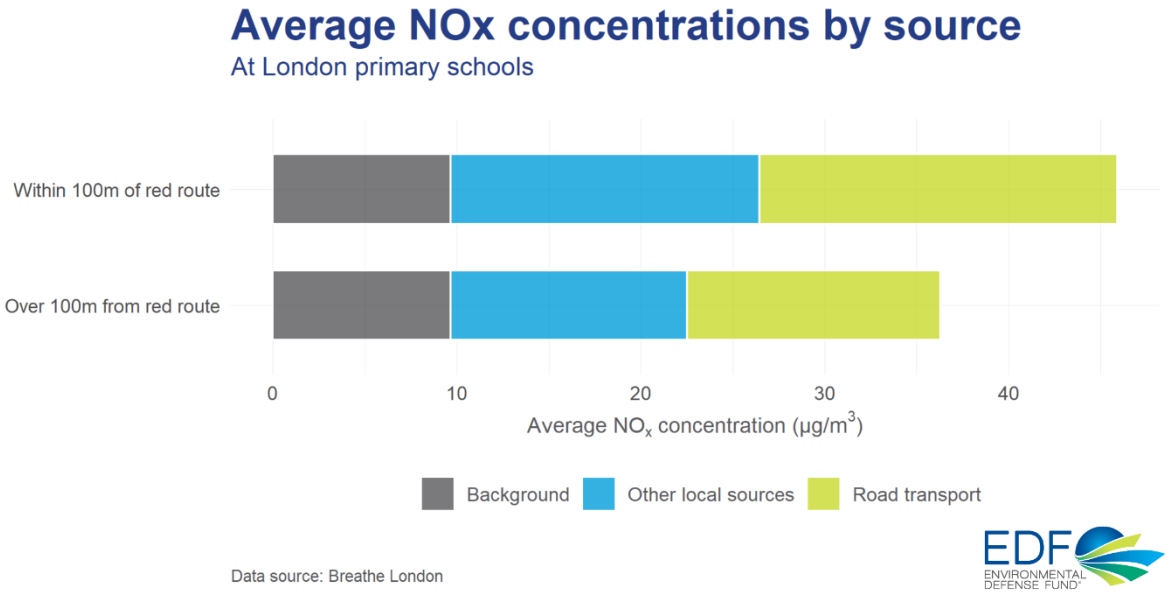
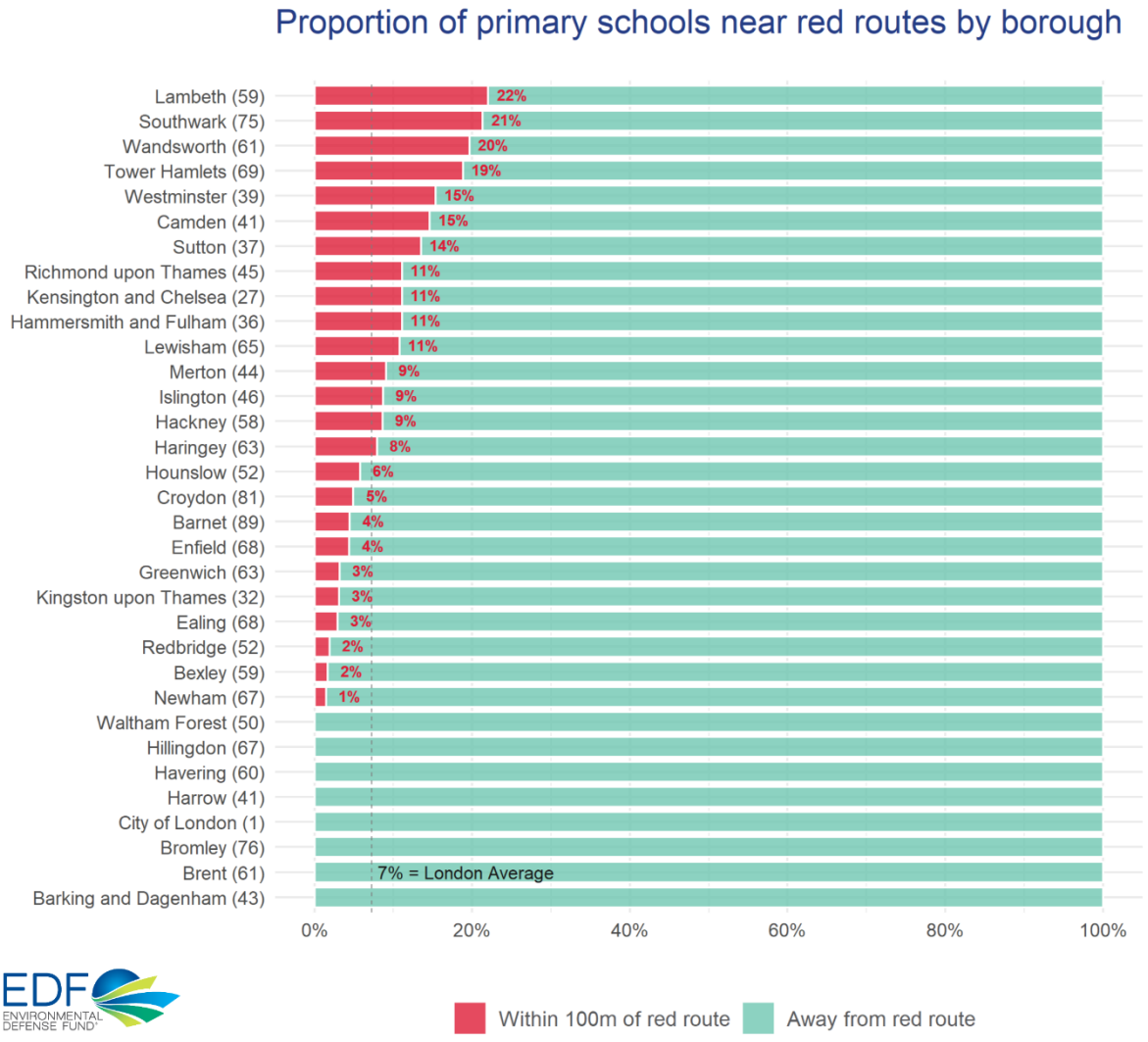


Figure 16


Proportion of primary schools near red routes by borough
Lambeth (59) 22%
Southwark (75) 21%
Wandsworth (61) 20%
Tower Hamlets (69) 19%
Westminster (39) 15%
Camden (41) 15%
Sutton (37) 14%
Richmond upon Thames (45) 11%
Kensington and Chelsea (27) 11%
Hammersmith and Fulham (36) 11%
Lewisham (65) 11%
Merton (44) 9%
Islington (46) 9%
Hackney (58) 9%
Haringey (63) 8%
Hounslow (52) 6%
Croydon (81) 5%
Barnet (89) 4%
Enfield (68) 4%
Greenwich (63) 3%
Kingston upon Thames (32) 3%
Ealing (68) 3%
Redbridge (52) 2%
Bexley (59) 2%
Newham (67) 1%
Waltham Forest (50)
Hillingdon (67)
Havering (60)
Harrow (41)
City of London (1)
Bromley (76)
Brent (61)
Barking and Dagenham (43)
7% = London Average
0%
20%
40%
60%
80%
100%
EDF ENVIRONMENTAL DEFENSE FUND
Within 100m of red route
Away from red route

Appendix 2: Overview of Mayor's key air quality initiatives[114]

Toxicity "T" Charge

The T Charge, which was established in June 2017, operated in the existing central London Congestion Charge Zone and applied to vehicles that did not meet Euro 4 standards during Congestion Charging hours. The charge was in addition to the Congestion Charge.

Ultra Low Emission Zone (ULEZ)

The ULEZ, which was established on 9 April 2019, operates in the existing central London Congestion Charge Zone. The ULEZ operates 24 hours a day, every day of the year except Christmas Day. In order to avoid paying the ULEZ charge, vehicles driving in the affected area must meet certain emission standards.

Improvements to the TfL Bus Fleet

Since 2018, measures have been taken to retrofit the bus fleet and phase out pure diesel double-deck buses. Low Emission Bus Zones have reduced roadside air pollution concentrations since they were introduced. The number of electric buses in London has increased from 22 in 2016 to 280 in 2020.

Electrification

Steps have been taken to consider and plan for wider electrification across the city. Since 2016, the number of rapid charge points has increased from 40 to approximately 400.

Green Infrastructure

Since 2016, more than 280,000 new trees have been planted across London and approximately £300,000 has been invested to deliver green measures at schools in areas exceeding legal pollution limits.

[114] The full list of initiatives can be found here.

Appendix 3: Summary of 14 London schools at or exceeding the legal NO2 limit[115]

Name	Borough	Phase	NO_2 2016	NO_2 2019	Reduction 2016 - 19
Argyle Primary School	Camden	Primary	52	41	-22%
St Josephs Catholic Primary School	Camden	Primary	54	42	-23%
St Paul's CofE Primary School*	**Hammersmith and Fulham**	**Primary**	**55**	**43**	**-22%**
Central Foundation Boys' School*	**Islington**	**Secondary**	**55**	**42**	**-24%**
Oasis Academy South Bank	Lambeth	Secondary	54	41	-24%
St Anne's Catholic Primary School	Lambeth	Primary	53	40	-24%
Canon Barnett Primary School	Tower Hamlets	Primary	56	44	-23%
Woolmore Primary School	Tower Hamlets	Primary	54	43	-21%
Hampden Gurney CofE Primary School	Westminster	Primary	52	40	-22%
The St Marylebone CofE School	Westminster	Secondary	54	42	-22%
Christ Church Bentinck CofE Primary School	Westminster	Primary	53	42	-22%
St Clement Danes CofE Primary School	Westminster	Primary	56	42	-25%
St Mary's Bryanston Square CofE School	Westminster	Primary	54	42	-22%
St Peter's Eaton Square CofE Primary School	Westminster	Primary	56	42	-24%

[115] Mayor of London, Press Release, Mayor unveils plans for further reduction in pollution at schools, 10 November 2020

Other formats and languages

If you, or someone you know needs this report in large print or braille, or a copy of the summary and main findings in another language, then please call us on: 020 7983 4100 or email assembly.translations@london.gov.uk

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Email 与我们联系。

Hindi

यदि आपको इस दस्तावेज का सारांश अपनी भाषा में
चाहिए तो उपर दिये हुए नंबर पर फोन करें या उपर दिये
गये डाक पते या ई मेल पते पर हम से संपर्क करें।

Vietnamese

Nếu ông (bà) muốn nội dung văn bản này được dịch sang tiếng Việt, xin vui lòng liên hệ với chúng tôi bằng điện thoại, thư hoặc thư điện tử theo địa chỉ ở trên.

Bengali

আপনি যদি এই দলিলের একটা সারাংশ নিজের ভাষায় পেতে চান, তাহলে দয়া করে ফো করবেন অথবা উল্লেখিত ডাক ঠিকানায় বা ই-মেইল ঠিকানায় আমাদের সাথে যোগাযোগ করবেন।

Greek

Εάν επιθυμείτε περίληψη αυτού του κειμένου στην γλώσσα σας, παρακαλώ καλέστε τον αριθμό ή επικοινωνήστε μαζί μας στην ανωτέρω ταχυδρομική ή την ηλεκτρονική διεύθυνση.

Urdu

اگر آپ کو اس دستاویز کا خلاصہ اپنی زبان میں
درکار ہو تو، براہ کرم نمبر پر فون کریں
یا مذکورہ بالا ڈاک کے پتے یا ای میل
پتے پر ہم سے رابطہ کریں۔

Turkish

Bu belgenin kendi dilinize çevrilmiş bir özetini okumak isterseniz, lütfen yukarıdaki telefon numarasını arayın, veya posta ya da e-posta adresi aracılığıyla bizimle temasa geçin.

Arabic

إذا كنت بحاجة إلى الحصول على ملخص لهذا المستند
بلغتك، فيرجى الاتصال برقم الهاتف أو
العنوان البريدي العادي أو عنوان البريد
الإلكتروني أعلاه.

Punjabi

ਜੇ ਤੁਸੀਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਦਾ ਸੰਖੇਪ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਲੈਣਾ ਚਾਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਇਸ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਉਪਰ ਦਿੱਤੇ ਡਾਕ ਜਾਂ ਈਮੇਲ ਪਤੇ 'ਤੇ ਸਾਨੂੰ ਸੰਪਰਕ ਕਰੋ।

Gujarati

જો તમારે આ દસ્તાવેજનો સાર તમારી ભાષામાં
જોઈતો હોય તો ઉપર આપેલ નંબર પર ફોન કરો
અથવા ઉપર આપેલ ટપાલ અથવા ઈ-મેઈલ સરનામા
પર અમારો સંપર્ક કરો.

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The London Assembly

City Hall
The Queen's Walk
More London
London SE1 2AA

Website: www.london.gov.uk/abous-us/london-assembly
Phone: 020 7983 4000

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