Demystifying Air Pollution in London

LONDON COUNCILS

Overview

Air pollution is a significant health, economic and environmental problem for the UK generally and in London specifically that requires concerted efforts from a variety of stakeholders to address effectively.

In London alone, air pollution contributes to in excess of 9,400 premature deaths every year, and costs the health system between £1.4 and £3.7 billion per year, as well damaging buildings and biodiversity through the formation of pollutants into acid rain.

Air pollution has received a lot of media attention in recent years, with sometimes conflicting messages and often very technical information. This brief report aims to draw together existing evidence and research on air pollution in London to demystify these messages and technical terms. It gives details of current local, national, and international actions to prevent further, dangerous air pollution, while also highlighting the role of the various different stakeholders, including London boroughs, within this. It explains the terminology used, the health effects experienced, the challenges facing policy makers and some potential solutions.

The report also highlights the importance of learning from previous mistakes, such as the policy to support diesel vehicles to reduce carbon emissions without considering the impacts this policy had on air quality. Any effort that addresses the air pollution challenge needs to be holistic in nature and assess the potential for unintended consequences.

Pollutants and their impacts

Air pollution encompasses all types of pollution in the air. But much of the legislation, and subsequently the discussions in the media, refer to a few specific pollutants, due to their high prevalence and significant, negative health effects. These are Nitrogen Dioxide (NO_2) and Particulate Matter (PM). This report focuses on these two pollutants.

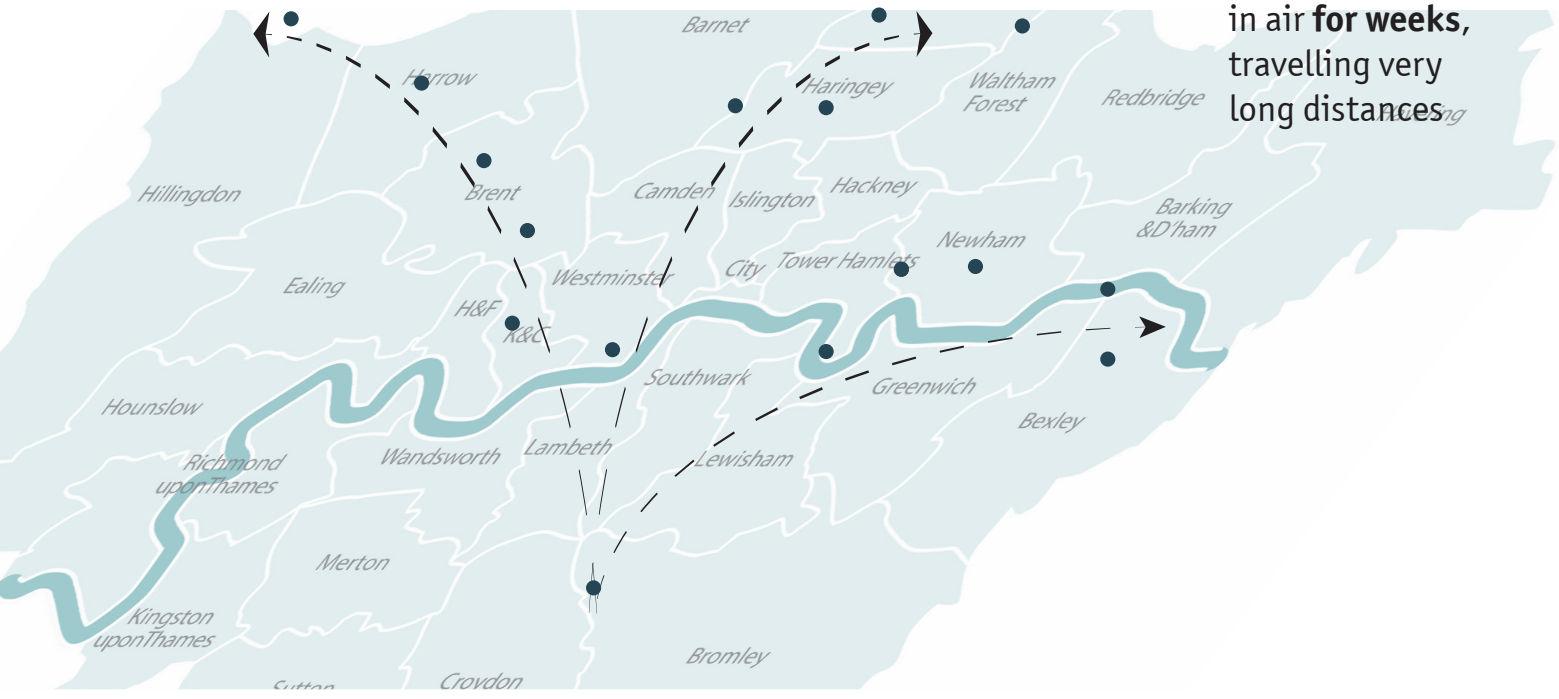
Air pollution does not respect administrative boundaries. Air pollution in London is a mixture of emissions created locally, and those from background concentrations. In particular, particles measuring between 0.1 µm and 1 µm in diameter can remain suspended for weeks and so can be transported long distances. Therefore local, national and international action is crucial to ensure that dangerous levels of air pollution are tackled.

There are various sources of NO_2 and PM, transport is the main one, but others that contribute significantly include: energy production; industrial processes and construction.

Understanding where the different pollutants come from is important to guide effective policy formation.

The micrometre (SI symbol: µm) is a unit of length equaling 1×10–6 metre; that is, one millionth of a metre (or one thousandth of a millimetre, 0.001 mm, or about 0.000039 inch).

Particles measuring between **0.1µm and 1.0 µm** can remain suspended in air **for weeks**, travelling very long distances



London's air pollution costs our health care system as much as **£3.7 billion a year** ...

...and contributes to more than **9,400 premature deaths** a year in London

Transport

Traffic reduction is a crucial factor in improving air quality; given exhaust emissions and tyre wear and tear are the main contributors to air pollution in London. Not every single car trip can be done by other modes, therefore the traffic that remains must be clean.

Electric vehicles offer no emissions at tailpipe, and also produce less PM from other areas such as brakes and engine soot. But it is important to remember that they do produce emissions, those that derive from the production of the electricity that they use to charge. However, there is more and more research showing that this is still lower than the overall emissions seen with petrol and diesel vehicles, and even hydrogen ones. Additionally, this should only get better as the UK's power sector decarbonises. However, electric vehicles are not completely immune from other environmental impacts and one issue that is emerging more and more is the sourcing of lithium for the batteries. There are a number of negative environmental and social impacts resulting from mining lithium and these need to be reduced or ideally completely removed to manage this more effectively in the future. Re-using and recycling of lithium needs to play a greater role in this.

There are issues that need to be addressed with the regulations that govern vehicle engine standards in Europe – the Euro standards. Firstly, they apply at different levels to different types of vehicle, for instance there are different regimes for heavy goods vehicles and private cars. This has led to a difference in the performance of the current Euro VI/6 standards. It is widely acknowledged that the Euro VI for HGVs has been quite effective in reducing the main pollutants, whereas the Euro 6 standard for private cars has not been so adequate, given the laboratory conditions the vehicles are tested in. It has now been shown that many Euro 6 cars emit much more than they claim to in real driving conditions, and trust in the manufacturers has been eroded due to the 'Dieselgate' scandal.

Lithium is a soft, silvery-white alkali metal. It is the lightest solid element. Most of the world's lithium production is in South America, where lithium-containing brine is extracted from underground pools and concentrated by solar evaporation. Each batch takes from 18 to 24 months.

Transport is one of the main sources of NO_2 and PM - Other significant sources include **energy production, industrial processes and construction**

Health

Air pollution has a negative effect on a number of different aspects of human health. In London, 9,400 premature deaths are attributed to poor air quality and a cost of between £1.4 and £3.7 billion a year to the health service.

There are different effects depending on the length and intensity of exposure. For example, short term exposure (a few hours) to high levels of NO_2 can irritate the airways and cause severe coughing and exacerbate existing respiratory illnesses, which is uncomfortable at best, and dangerous at worst for vulnerable people (sick and older or younger people for example).

A King's College study in 2015 associated up to 5,900 premature deaths across London with long-term NO_2 exposure, and a further 3,500 with long term exposure to particulates.

Long term exposure can contribute to someone developing a number of illnesses, such as asthma, pulmonary disease and lung cancer. It has also been shown to stunt the growth of children's lungs. This is particularly worrying, as around one-third of London's schools have been found to be close to busy roads that suffer illegal levels of NO_2 pollution.

There is new research that begins to show a link between air pollution and brain function. Some American research even suggests that there is a link between air pollution and dementia, although the understanding of this issue is in the early stages and it is stressed that more research must be completed.

It is clear, however, that poor air quality has significant effects on human health and needs to be addressed as a matter of urgency. Poor air quality is also a social justice issue, as people who live in deprived areas are on average exposed to higher levels of air pollution.

Key stakeholders

Air pollution does not respect administrative boundaries. This means that all levels of government have to work together – locally, regionally, nationally and internationally.

There are a number of organisations at different levels that are involved with trying to improve air quality. There are some who conduct research and provide scientific advice, such as the World Health Organisation (WHO) and there are others that look to bind governments by using conventions and agreements, such as the United Nations. Then there are the formal governmental bodies that impose legislation, such as the European Union, and national, regional, and local governments.

London is different to the rest of the English local authorities in that the Mayor provides the guidance for air quality plans, rather than central government. This change was implemented due to the recognition that London needs to go further than other areas as the problem is so severe. The unfortunate effect of these many layers of action and control is that it can become confusing to know who is responsible for what, and what each stakeholder is doing. Local authorities have been leading on improving air quality for years. They have a number of policy tools at their disposal to improve air quality, such as improving the public realm to encourage walking and cycling, the introduction of green infrastructure to reduce pollution naturally and using their planning powers and parking roles to encourage less polluting buildings and vehicles. But local government funding pressures are making it harder and harder to hold back the tide of pollution, with London's population growing year on year.

of London's schools are close to roads with illegal levels of **NO_2 pollution**

Future challenges

London is expected to be home to 10 million people by 2029. This will increase the pressure on the road network and worsen air pollution. Local authorities across the UK are facing extreme funding pressures and will no longer be able to undertake business as usual.

The fact that the UK is leaving the European Union is another factor given that the EU plays a crucial role in implementing safeguards that control levels of harmful air pollutants. Currently, the UK legal standards for NO_2 and PM are derived from EU Directives.

Solutions

The coordination of policy between different levels of government is crucial if London, and the UK, is going to reduce the harmful effects. As outlined above, boroughs have a number of policy levers at their disposal, but they do not have all the power they need to address this issue alone. There are some things that can only be addressed by the Mayor, such as adequate public transport provision for all of London. There are some initiatives that have to be led by national government, such as reducing the pollution from power plants and introducing national policies to encourage cleaner vehicle production.

Innovative technology will also play a role in providing further solutions and London needs to keep an eye out for this around the world. It is important that boroughs, the Mayor and government continue to be open to innovation and work with different organisations to trial these as appropriate.

Conclusion

Continued research and analysis is needed to understand further the impacts of air pollution and how this challenge can be addressed most effectively. This also needs to ensure that we avoid causing unintended consequences, as has happened in the past.

Tackling air pollution can provide numerous benefits to society, from improving a city's resilience, to making our cities more inviting and pleasant places to live. Addressing the air pollution challenge will therefore also help with a number of other challenges, particularly in light of a rising population. Furthermore, everyone needs to continue to play their part in addressing air quality and increase the pace on this to ensure no more unnecessary deaths occur.

The EU has played a crucial role in controlling levels of harmful air pollutants and the current **UK legal standards for NO_2 and PM are derived from EU directives**

London's population is projected to be **10 million by 2029**, putting greater strain on the road and transport network

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