

AIR POLLUTION IN PUTNEY – AN EXPLANATORY NOTE

1. The aim of this note is to describe the different kinds of atmospheric pollution to which we are subject in Putney. Atmospheric pollution can be grouped into two main types: those gases that cause global heating, and gases and small particulates that damage our health.

Global heating

2. According to ongoing temperature analysis conducted by scientists at NASA's Goddard Institute for Space Studies, the average global temperature on Earth has increased by a little more than 1° Celsius (2° Fahrenheit) since 1880 as a result of human activity starting with the Industrial Revolution. This warming trend has greatly accelerated over the past half-century, as industrialisation has spread across the world – most dramatically in China, but also in many other parts of the developing world. This increase may not seem very much, but note that it is only the average, and variations about that average are much greater.

3. As a result of this warming, the polar ice caps are melting, and glaciers are retreating. There is therefore a greater mass of water in the world's oceans, and as the oceans also warm up, the volume of sea water is increasing more rapidly. Therefore, sea levels are rising. There is also substantial evidence that the warming of both the atmosphere and the oceans is contributing to an increase in the frequency and severity of catastrophic weather events such as hurricanes in the tropics and sub-tropics, and intense rainstorms in temperate regions such as the UK.

4. Many different types of gaseous emissions contribute to global heating. The biggest contributor is carbon dioxide (CO₂) - emitted when wood or any fossil fuel (coal, gas, oil, petrol etc) is burnt. Some other gases have more potent impacts on global warming, but luckily they are less prevalent. Methane (CH₄) is an example, one source of which is belching by cows, and another source is from rotting waste.

5. There is a substantial scientific consensus that emissions of global heating gases need to be reduced rapidly, in order to limit the total temperature rise to 2 degrees Celsius at most, and preferably 1.5 degrees. If emissions are not brought down rapidly over the next few decades, there is an increasing likelihood that the rate of warming will accelerate further, becoming increasingly difficult to reverse and leading to catastrophic rises in sea levels.

6. Many governments have in recent years announced more ambitious objectives for reducing global warming emissions; the UK Government has set an objective of net zero emissions by 2050. "Net zero" recognises that some emissions will continue, so the plan is to develop new technologies for removing carbon from the atmosphere so as to counterbalance the remaining emissions.

7. Achieving net zero will involve considerable changes, such as phasing out boilers burning coal, gas or oil; switching from petrol or diesel to electric power for road, rail, sea and air transport; and greatly improving the thermal insulation of buildings (especially houses).

8. A very large increase in electricity generation will be required, and this will need to be from renewable sources such as wind turbines and solar panels, and/or from nuclear power. Hydrogen may also play a useful role, although currently the production of hydrogen requires large amounts of electricity.

9. Car manufacturers are investing heavily to develop and advertise electrically-powered models. Sales of electric cars are rapidly increasing (in the UK and many other countries) but from a very low base; sales of diesel cars are falling rapidly.

10. There has not yet been a commensurate investment in the development of heat pumps, hydrogen boilers or solar panels for domestic heating, but an increasing focus on such technologies will be needed over the next few years.

Local air pollution

11. London suffers from many different forms of local air pollution. The two most serious, in respect of their impacts on human health, are oxides of Nitrogen - predominantly Nitrogen dioxide (NO₂) - and fine particulate matter. These two pollutants are very different in many respects, and these differences are important.

12. High concentrations of NO₂ are very localised. The main source is exhaust emissions, particularly from older diesel vehicles. So the worst locations are roads carrying high levels of traffic, and especially where the traffic is congested rather than free-flowing.

Unfortunately for us in Putney, our High Street is a prime example, exacerbated by the canyon effect of having four-storey buildings quite close to the road. The NO₂ pollution is worst at the bottom end of the High Street, between Putney Bridge Road and the Lower Richmond Road. Upper Richmond Road, Putney Bridge Road, Lower Richmond Road and Putney Hill are also blackspots, but not as bad as the High Street.

13. We must emphasise just how localised NO₂ pollution is. On a wide pavement, such as we now enjoy along most of the eastern side of the High Street, the NO₂ concentrations at the edge of the pavement closest to the vehicle carriageway are considerably higher than at the other edge, by the shop frontages. On windy days, NO₂ pollution will be blown down the side streets leading off the High Street. But the annual average NO₂ concentrations drop away quite rapidly, once off the High Street.

14. The UK legal limit for NO₂ is that the annual average should not exceed 40 micrograms per cubic metre (µg/m³). The official monitoring station on the High Street has recorded an average of a little over 70 µg/m³ throughout 2017 to 2019 (2020 figures were lower, thanks to lockdowns). This should improve over the next few years, driven by motorists being induced, by the forthcoming expansion of the Ultra Low Emission Zone, to switch from the most polluting vehicles to cleaner ones, and by the natural replacement of vehicles (especially where people buy electric vehicles).

15. By contrast, fine particulate pollution (PM_{2.5}) is much more dispersed. The World Health Organisation recommends a guideline limit for PM_{2.5} of 10 µg/m³, and the London Environment Strategy published in May 2018 commits to meeting this limit by 2030. In 2016 the average PM_{2.5} concentration in Greater London was 13.3 µg/m³, and nowhere in

Greater London had a concentration below $10 \mu\text{g}/\text{m}^3$. The highest levels (between 16 and $18 \mu\text{g}/\text{m}^3$) were mostly in central London – Westminster and the City – with the levels gradually reducing in areas further from the centre; in Putney the levels were between almost 12 and $14 \mu\text{g}/\text{m}^3$. The lowest level, in roads the furthest from the main roads (obtained by atmospheric modelling) is estimated to be $11.68 \mu\text{g}/\text{m}^3$, still well above the 10.

16. Based on current evidence, $\text{PM}_{2.5}$ is thought to be the air pollutant that has the greatest impact on human health. Both short and long-term exposure to $\text{PM}_{2.5}$ increases the risk of mortality from lung and heart diseases as well as increased hospital admissions: these particles can penetrate the lung barrier and enter the blood system. Small particulate pollution has health impacts even at very low concentrations – indeed no threshold has been identified below which no damage to health is observed. There is even evidence that very small particulates can enter the embryo in the womb; children growing up exposed to $\text{PM}_{2.5}$ are more likely to have reduced lung function and develop asthma. The UK government's Committee on the Medical Effects of Air Pollution (COMEAP) estimates exposure to $\text{PM}_{2.5}$ contributes to 29,000 premature deaths in the UK every year.

17. Unlike other pollutants, such as NO_2 , a big proportion of $\text{PM}_{2.5}$ in London comes from regional, and often transboundary (non-UK) sources. In 2016 the estimated background concentration for $\text{PM}_{2.5}$ was $10.2 \mu\text{g}/\text{m}^3$, meaning the external contribution to London's $\text{PM}_{2.5}$ levels alone was above the WHO guideline of $10 \mu\text{g}/\text{m}^3$.

18. Road transport is the largest individual source of $\text{PM}_{2.5}$ in London, accounting for 31% of local emissions. The introduction of the central London Ultra Low Emission Zone and cleaning up the bus and taxi fleets are expected to reduce $\text{PM}_{2.5}$ emissions coming from road transport. However, a growing proportion of road transport emissions are now non-exhaust emissions including road wear and particles from tyre and brake wear.

19. Biomass burning (including domestic wood-burning) is the second largest source of $\text{PM}_{2.5}$ in London, accounting for 16% of local emissions. Construction, which includes emissions from non-road mobile machinery, is the next largest source, making up 15% of local emissions. The next largest individual source is cooking (including commercial cooking) which contributes 13% of local emissions.

20. The Mayor of London considers that he has many of the powers required to tackle road transport $\text{PM}_{2.5}$ emissions. The Mayor's policies include:

- expanding the Ultra Low Emission Zone this October to the North and South Circulars;
- phasing out pure diesel buses and purchasing only hybrid or zero-emission double decker buses, with the entire fleet becoming 'zero emission' by 2037 at the latest;
- no longer licensing new diesel taxis and supporting the trade to upgrade to much cleaner 'zero emission capable' vehicles;

- reducing traffic volumes by encouraging mode shift from travelling by car to walking, cycling and using public transport, so that 80 percent of all trips in London to be made on foot, by cycle or using public transport by 2041.

The Mayor judges these policies will greatly reduce PM_{2.5} emissions from road transport, but he calls on the Government to take a lead on working with industry and other partners to seek solutions to reduce emissions from tyre and brake wear.

21. However, the Mayor considers that he needs additional powers to tackle non-transport sources, including:

- new powers to declare and enforce smoke control zones;
- addressing wood burner emissions through a new fit-for-purpose testing regime and information on appropriate technology/ fuels for smoke control zones at point of sale, as well as new powers for the Mayor to set tighter minimum emission standards for new wood burning stoves sold in London;
- new powers for regional and local authorities to control emissions from non-road mobile machinery; and
- new powers and improved coordination for river and maritime vessels.