

35

Air Pollution and Health

Working Towards Cleaner Air 2021+

Katie Cuming, Consultant in Public Health
Sam Rouse, Air Quality Science



Air pollution

- The contamination of the air we breathe, by any chemical, physical or biological agent that is potentially threatening to human and ecosystem health (WHO 2021)
- Indoor environment is influenced by outdoor air quality
- Particulate Matter (PMs), Nitrogen Dioxide (NO₂), Ozone (O₃), Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Benzene (C₆H₆), Lead (Pb), Iron (Fe), Copper (Cu), Zinc (Zn) Antimony (Sb)
- Very fine airborne PMs when inhaled are very harmful and can penetrate deep into the respiratory tract and enter the blood stream
- IARC – carcinogenic.....airborne pollution referred to as the invisible killer
- Where does it come from – transport, energy, heating, construction, events, intensive agriculture, industry, waste, cooking and more.....

Overview

- WHO: seven million premature deaths globally, 50,000 UK, 175 BHCC
- Increases morbidity and mortality from cardiovascular and respiratory disease (non communicable disease) including IHD, stroke and cancer
- Increases morbidity from lower respiratory tract infection, preterm birth and childhood illness – toxic intake associated with learning difficulties
- Higher risks for those in low and middle income regions worldwide and for those living in deprivation and in urban environments
- Cumulative impacts with underlying health conditions, deep coughs, Covid, smoking, poor diet & housing, sedentary lifestyles
- Latest global guidance includes lower recommended levels of pollutants for health
- Need all sectors to be involved with reducing pollutant levels
- No silver bullet - Air Quality Action Plan comprehensive & multidisciplinary

A Regular Media Feature

Pollutants prejudicial to health are distinguishable from greenhouse gases that allow incoming sunlight and absorb outgoing longwave radiation heating the lower atmosphere.

Climate Change has implications for air quality.

Cabbies want cash to scrap diesels

Graeme Paton Transport Correspondent
The chauffeur is under mounting pressure to introduce a diesel scrappage scheme to tackle dangerous levels of pollution in big cities.

diesel emissions, with a scrappage scheme seen as the most likely solution. Alternatives such as an increase in fuel duty or a toll on roads are said to be unlikely. The government is already

should be offered to poor families to scrap diesel cars and payments of £1,000 should be made to scrap polluting taxis. Yesterday's letter to the chauffeur backs his own suggestion, saying that it

reduce duty and to discourage the purchase of high-polluting vehicles. It was reported last month that officials at the Department for Transport were working on a diesel scrappage scheme as part of a series of measures

Short drives around town are the dirtiest

Ben Webster Environment Editor
Drivers who make short car journeys

a day are made in cars in which pollution controls are not working properly for the entire journey.

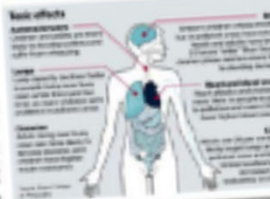
petrol cars, with NOx emissions 422 per cent higher after one minute than when the engine was fully warm. However,

Pollution on busy roads as bad as passively smoking ten a day

Ben Webster Environment Editor
A new study has found that the air quality in busy roads is as bad as passively smoking ten cigarettes a day. The study, which was carried out by researchers at the University of York, found that the air quality in busy roads is as bad as passively smoking ten cigarettes a day. The study, which was carried out by researchers at the University of York, found that the air quality in busy roads is as bad as passively smoking ten cigarettes a day.



that nitrogen is a pollutant in itself, but it is also a precursor to other pollutants. The study found that the air quality in busy roads is as bad as passively smoking ten cigarettes a day. The study, which was carried out by researchers at the University of York, found that the air quality in busy roads is as bad as passively smoking ten cigarettes a day.



Air pollution deprives you of a decent night's sleep

Graeme Paton Transport Correspondent
High levels of air pollution can

Cash-strapped councils hide pollution level

Nadreen Badshah
Councils are breaking the law by failing to monitor levels of air pollution

French plan to abandon petrol and diesel cars

Continued from page 1
change in policy needs to come with a reasonable lead time so motorists aren't suddenly left with vehicles that cannot

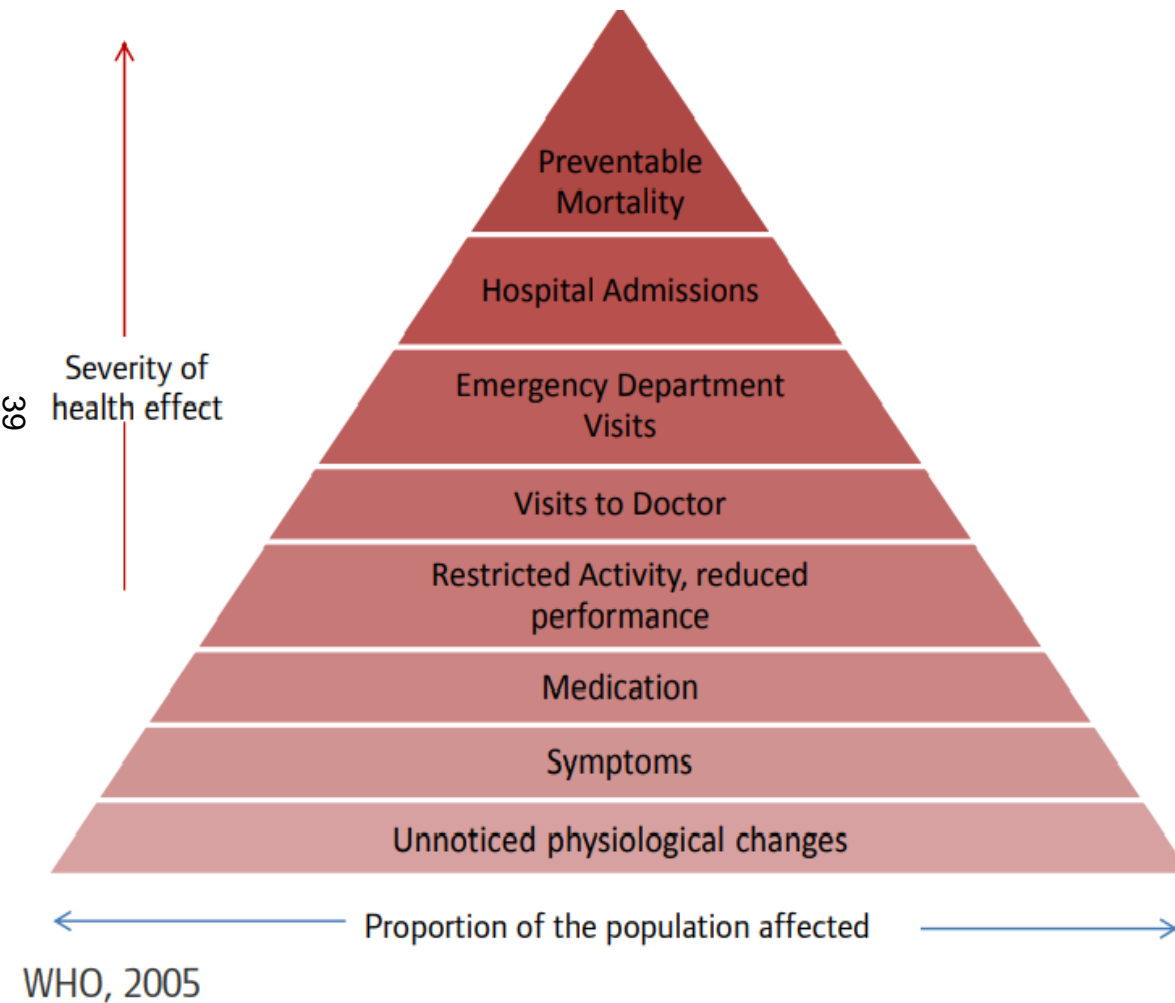
Bigger diesels have thrown away last green credential

Ben Webster Environment Editor
The single green advantage of diesel has disappeared, according to research showing that the average new car consumes almost as much fuel as the average petrol model. Previous governments used tax to
Risk with every breath
Five public health experts would be said to see the back of the internal combustion engine. The medical costs of exhaust fumes, especially from diesel, grow every month.



Brighton & Hove City Council

Impact of Air Pollution on Health



- Airborne Pollution is the largest environmental risk to public health
- Long term exposure to 'everyday' air pollutants over years contributes to CVD, lung cancer, respiratory vulnerability
- Short term impacts from day to day acute changes in pollutants
- Disproportionate impact on vulnerable – children, older people and social deprivation
- In recent years new evidence on health impacts of NO₂ as a toxic gas concentration, dose and exposure important

Source-Pathway-Receptor

- Gas or particles emitted from chimneys, vehicle tailpipes, brakes, tyre wear and fires
- Inhalation dose depends on emission, space and dispersion

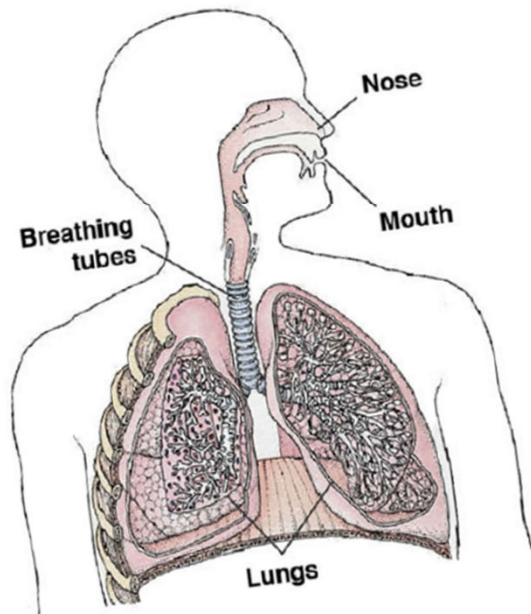
Emissions



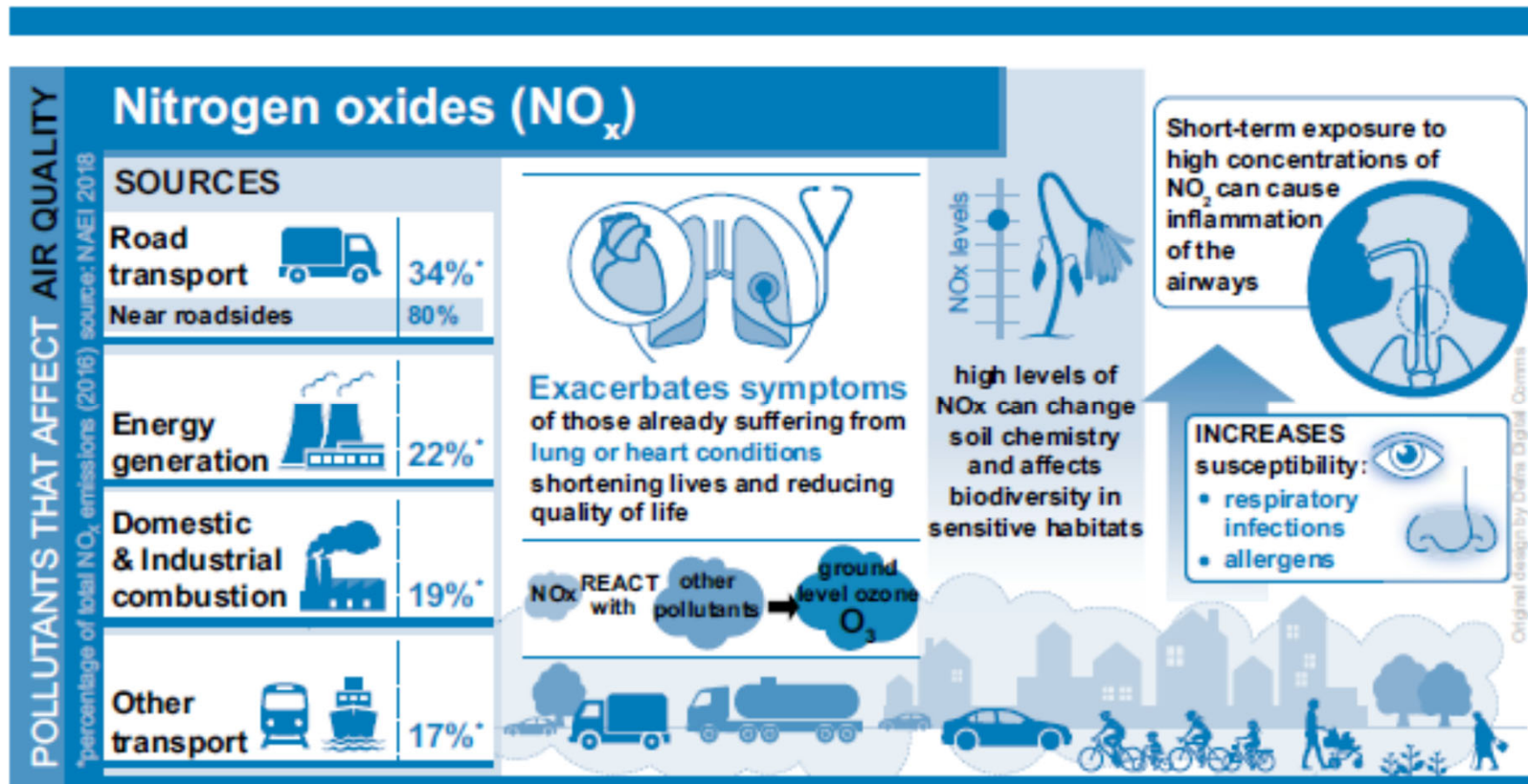
Dispersion



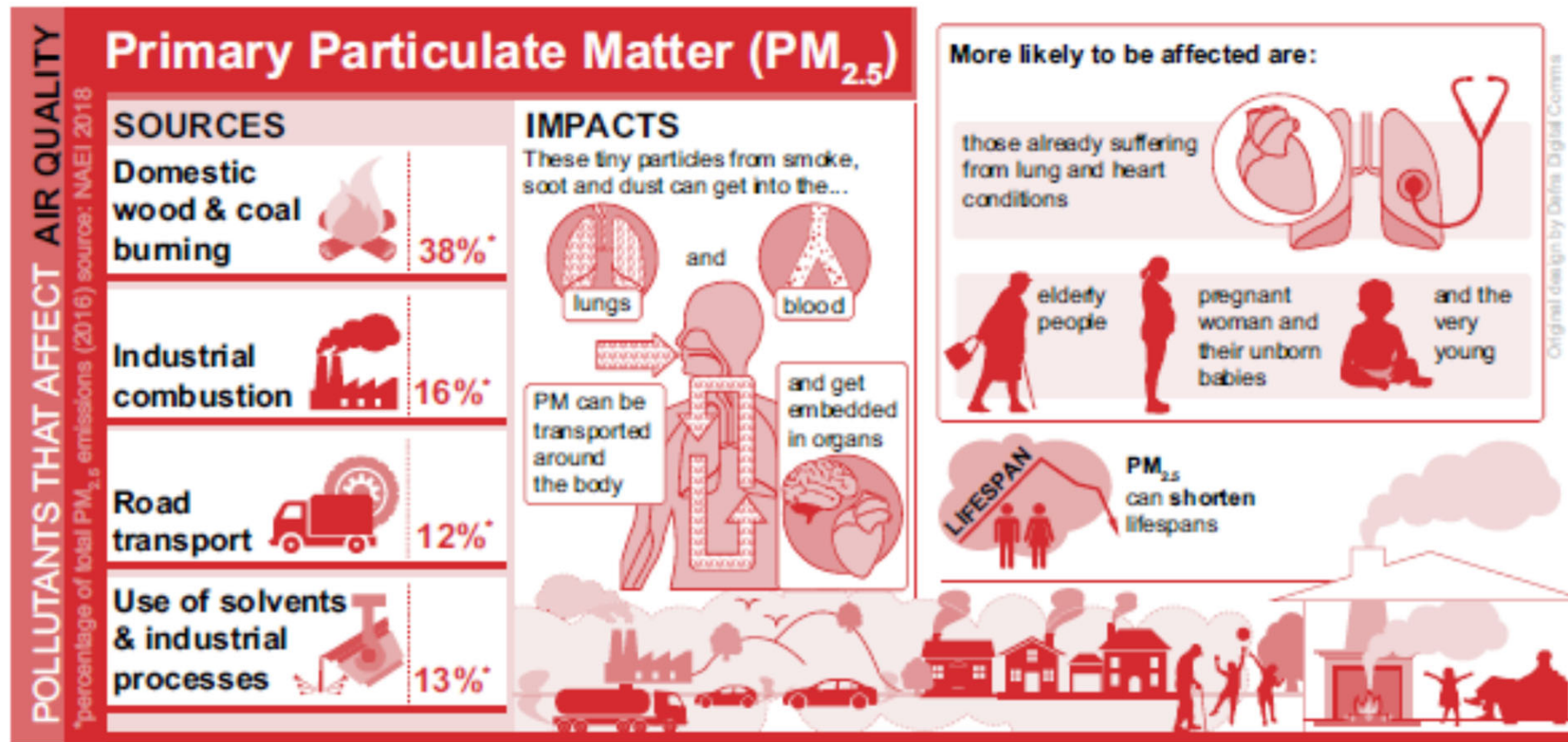
Inhalation



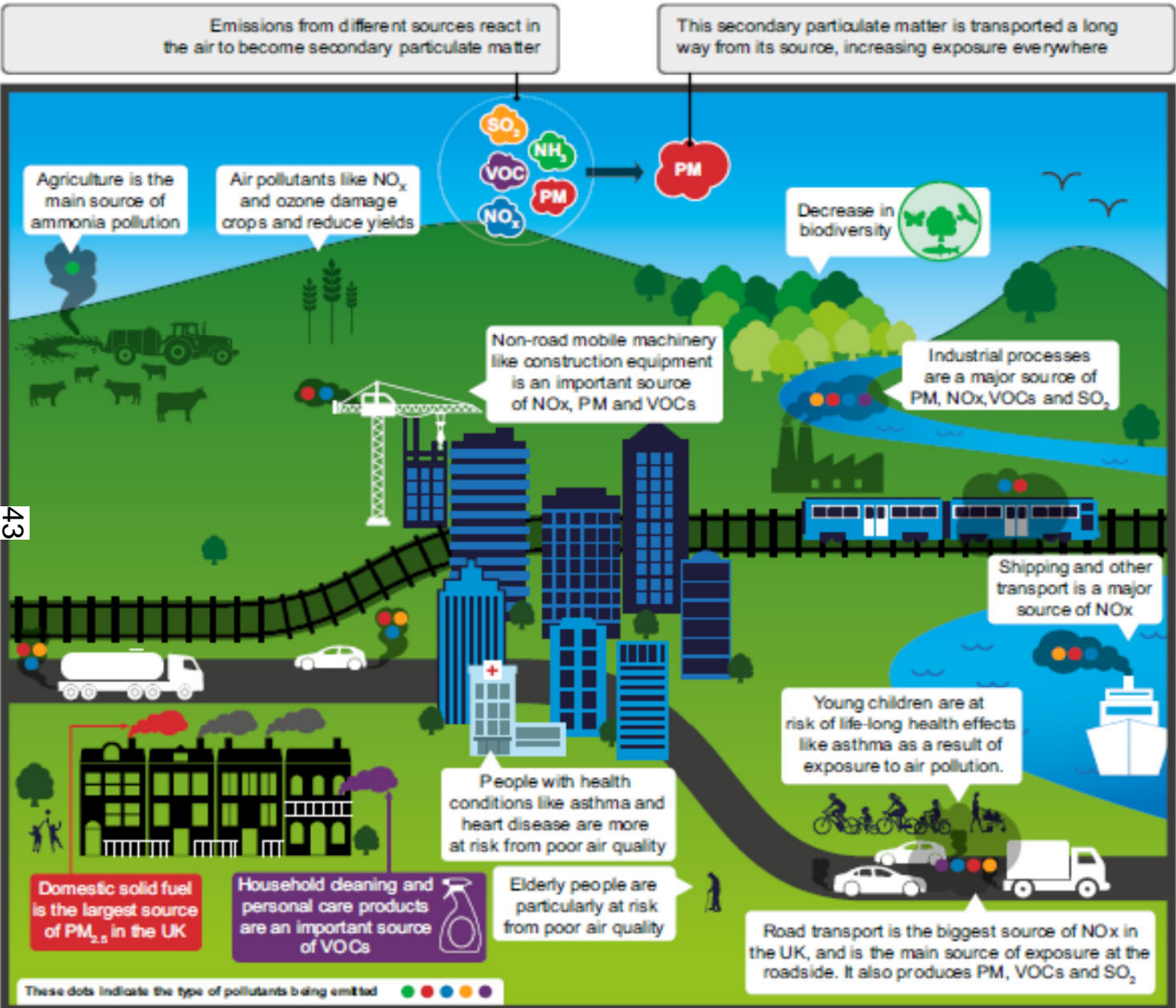
Adjacent to urban roads (1-10 metres) ~90% of ambient NO₂ is due to emissions from road transport: Lorry, bus, motorcycle, van and car.



Wood + Coal burning is a source of primary particles across the UK. Smokey chimneys are most common November to February and tend to be associated with stay at home weekend evenings. Oxide of nitrogen gas emissions from road traffic, shipping and agriculture contribute to nitrate particulate episodes across the Channel, Sussex and London.



The sources of air pollutants and their effects



Types of pollution	
Nitrogen oxides (NO _x)	Ammonia (NH ₃)
Sulphur dioxide (SO ₂)	Primary Particulate Matter (PM _{2.5})
Volatile organic compounds (NMVOCs)	

Sulphur dioxide sources diminished

In Brighton & Hove road traffic emissions are the dominant pollutant.

More concentrated in confined spaces

Oxides of nitrogen emissions from diesel vehicles registered before 2015 an issue.

Particles arise from wood and coal burning, brake and tyre wear, older diesels and nitrous emissions from transport.





Environment Act 1995

CHAPTER 25

LONDON: HMSO

£25.90 net

Part IV Local Authorities have a statutory duty to investigate air quality in their areas.

Protection for the most vulnerable not average sensitivity.

If outdoor air does not meet national standards statutory duty to declare an Air Quality Management Area (AQMA).

BHHC new Air Quality Action Plan will be for public consultation – the health and care sector is invited to provide feedback.

Action plan aims to accelerate improvement and surpass compliance with AQ standards.

Other applicable legislation Statutory Nuisance and the Clean Air Act.



EMIT

Atmospheric Emissions Inventory Toolkit

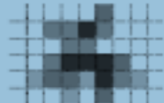
Transport Emissions



Industrial Emissions



Commercial and Domestic Emissions



Data Import Wizard

Integrated Mapper

Inventory Manager

UK GHG
IPCC
NAEI
EFT
UKEFD

Heavy/Light/Motorcycle
Bus/Taxi/LGV/HGV/Car

Emission Factors

Fleet Components

Greenhouse Gas Inventories

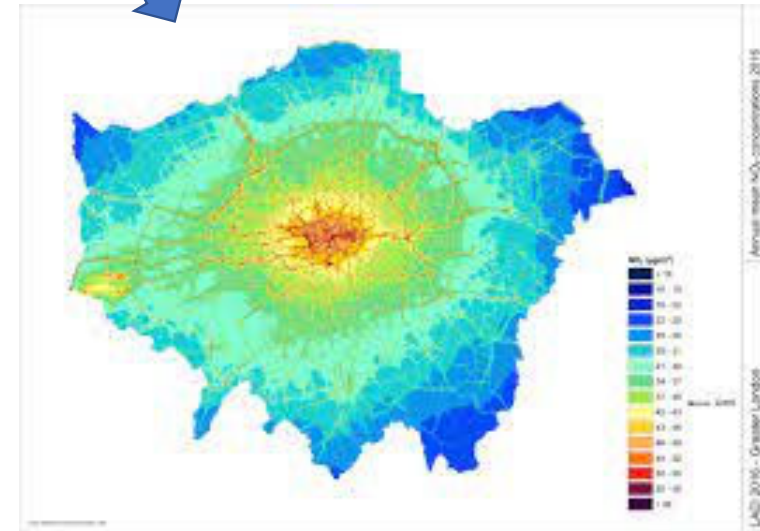
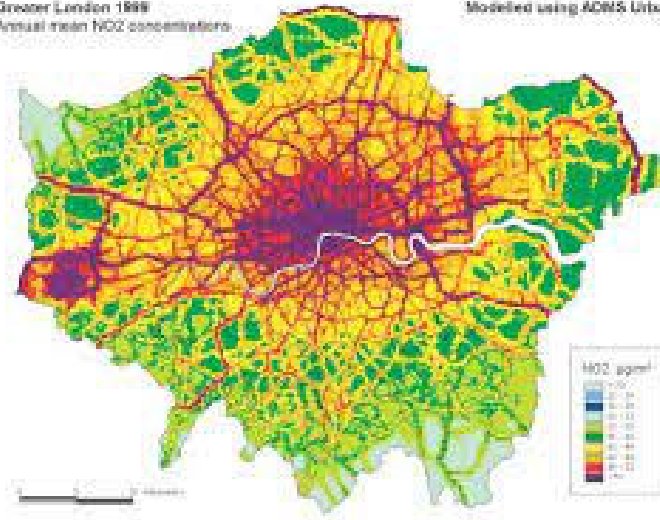
Source Apportionment

Advanced Air Quality Studies

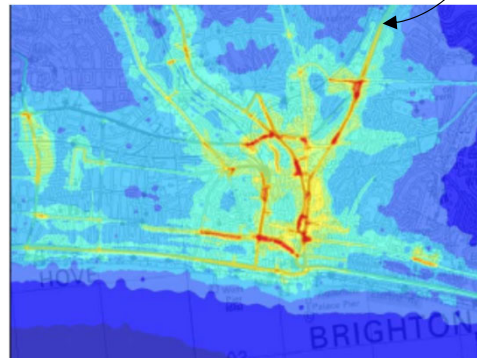
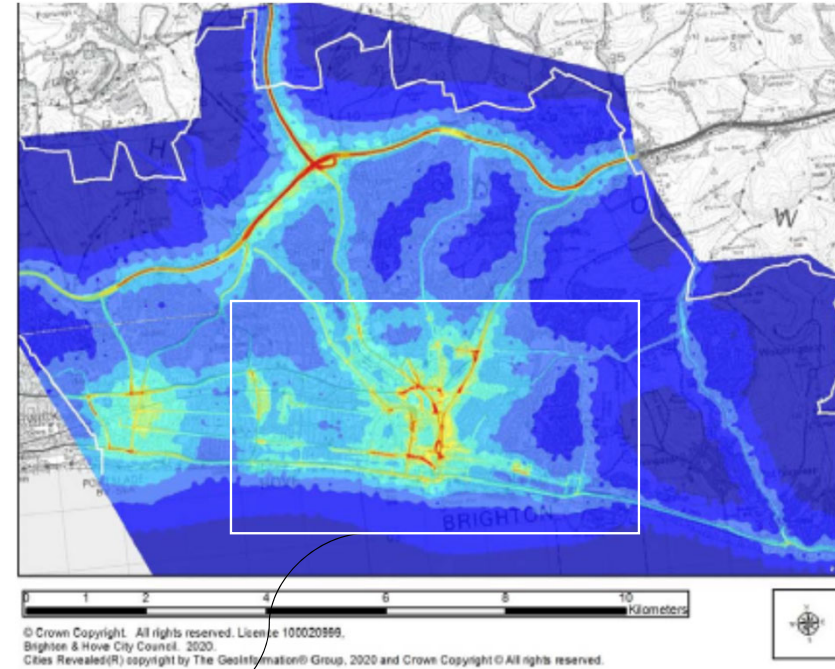
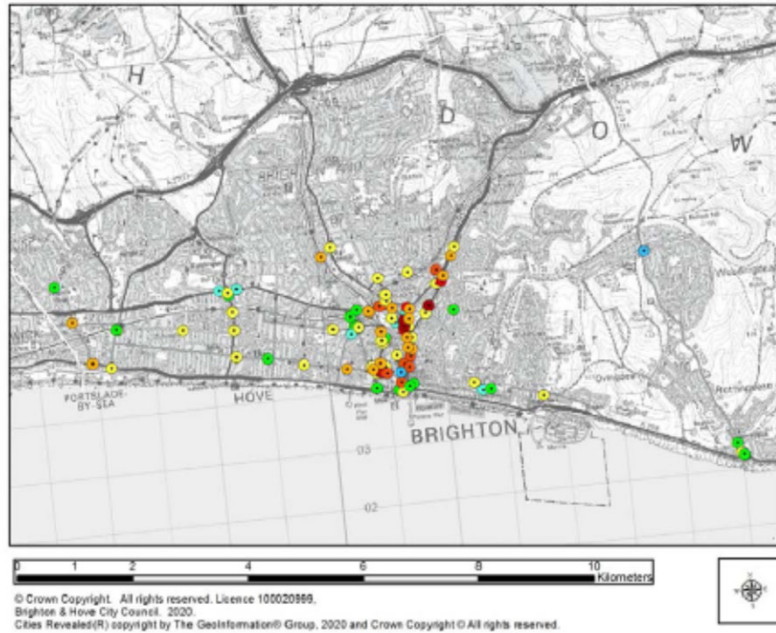
Low Emission Zones

Greater London 1999
Annual mean NO₂ concentrations

Modelled using ADMS Urban



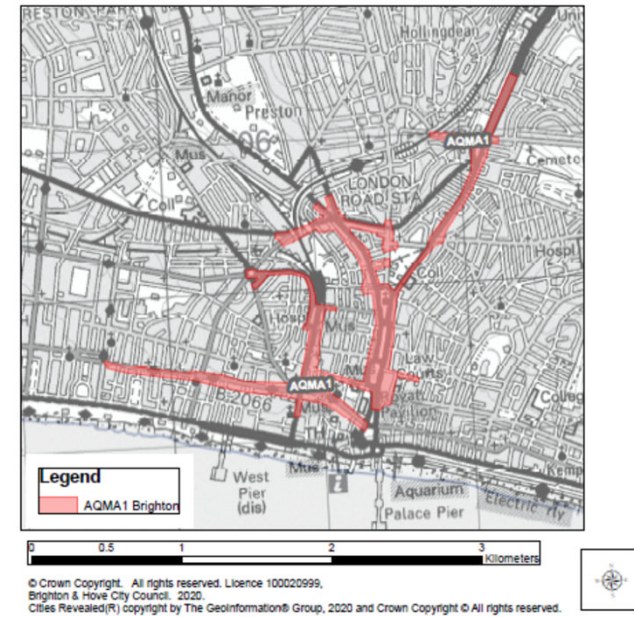
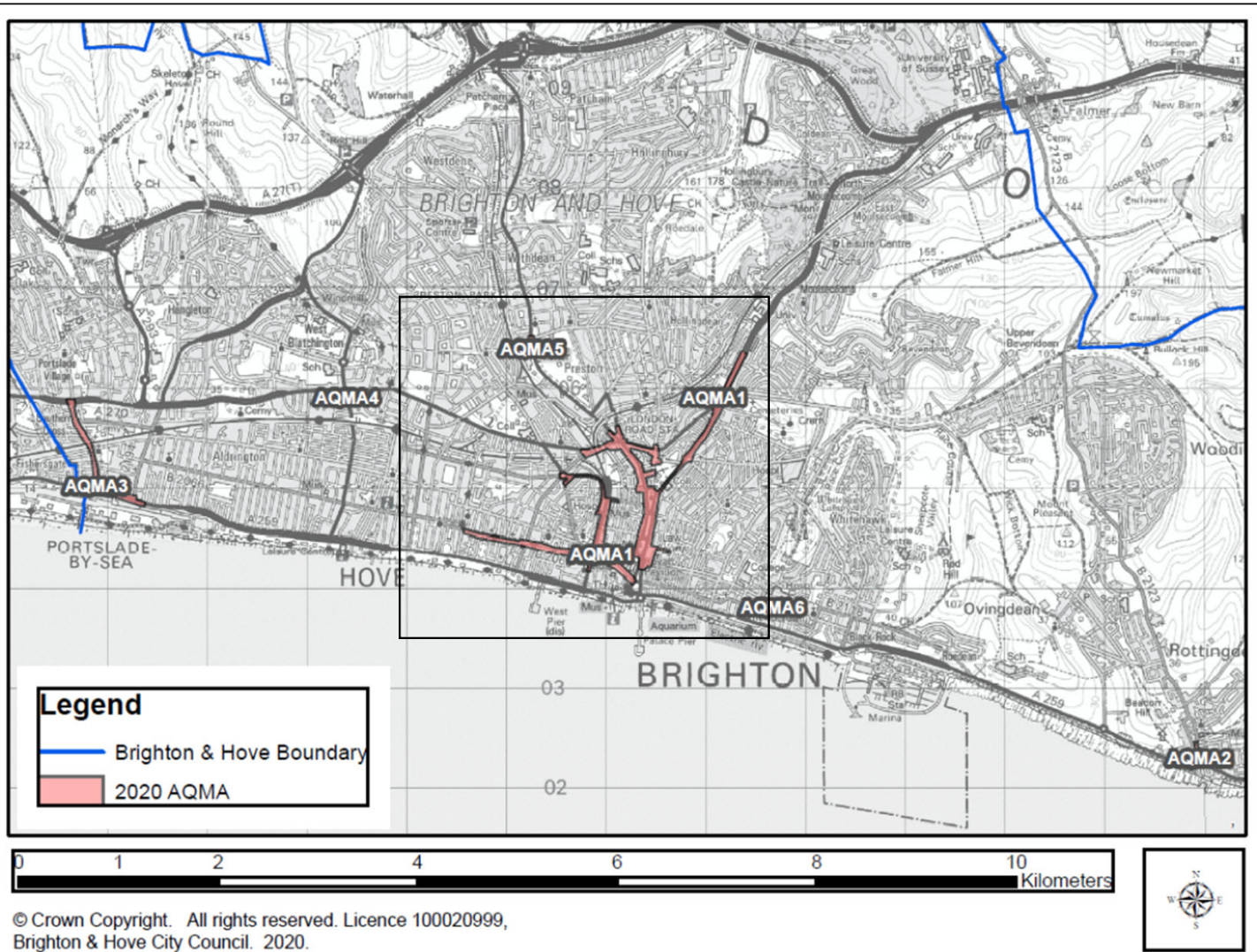
Monitoring and Computer Based Model



Capital and Revenue
Funding Required to
Sustain Statutory
Duties

2020 Air Quality Management Areas (AQMAs)

47



AQMA Settings and Planning



More walking a century ago



Policy Hooks: National and Regional Guidance



Parliamentary Time is required to deliver the Environment Bill.

Potential for updates to UK legislation and guidance for example the Clean Air Act.

Binding UK target for $PM_{2.5}$ scheduled for Autumn 2022.

SOLUTIONS

WHO Guidelines Sept 2021

- More stringent guidelines for nitrogen dioxide and particulate matter in breathable air
- Up to governments and devolved administrations to adopt into legislation or local objectives
- Race to see which City has the cleanest greenest credentials to attract investment
- Compact Clean Cities are in a good position to attract 21st Century business that helps avoid family aspiration to move elsewhere
- What are Best Available Techniques
- Beware of the word “Efficient” referring to hotter combustion - less smoke and carbon monoxide, that has potential to increase thermal NOx



WHO Air Quality Guidelines set goals to protect millions of lives from air pollution.

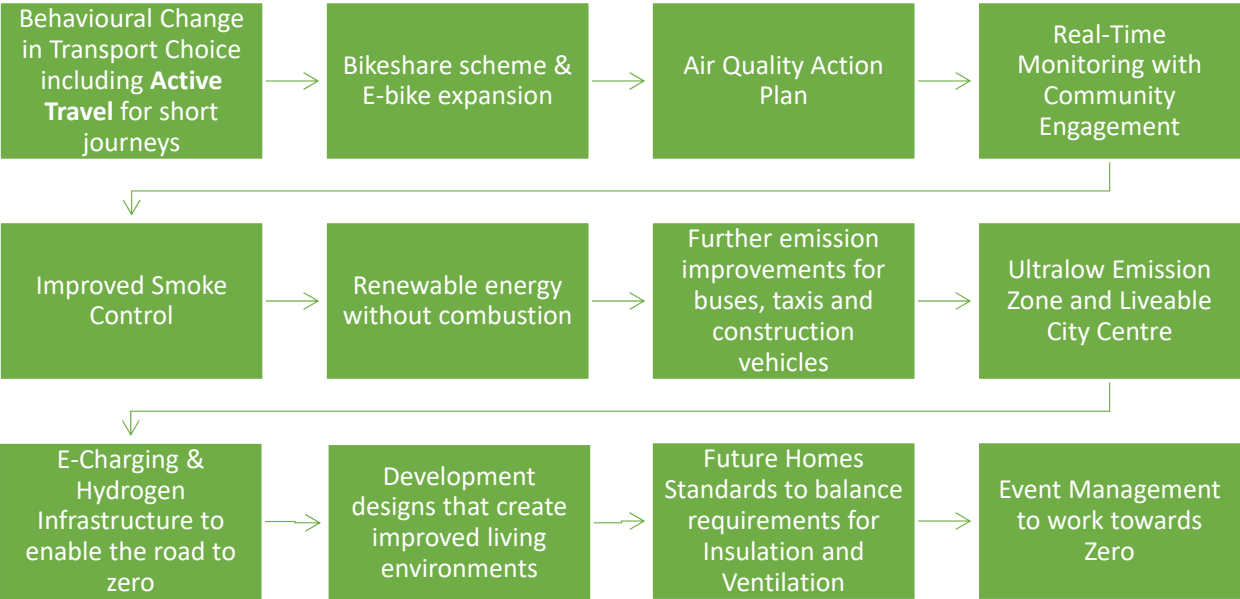
CLEAN AIR FOR HEALTH

#AirPollution





Local Actions



References

- [New WHO Global Air Quality Guidelines aim to save millions of lives from air pollution](#)
- [How we manage air quality in the city \(brighton-hove.gov.uk\)](#)
- [Brighton and Hove News » Government and council put £250k towards refit for cleaner buses](#)
- [More ultra-low emission buses for Brighton & Hove - What's On In Brighton & Hove \(whatsoninbrightonandhove.com\)](#)
- [Brighton & Hove electric taxi network funding \(brighton-hove.gov.uk\)](#)
- [eCargo Bike Accelerator project \(brighton-hove.gov.uk\)](#)
- [Fires and wood burning stoves – please consider your neighbours \(brighton-hove.gov.uk\)](#)
- [Smoke control areas: the rules - GOV.UK \(www.gov.uk\)](#)
- [Sussex-air :: Promoting better Air Quality in Sussex :: sussex-air.net :: Home](#)
- [Exploring the link between air pollution and inequality – AirQualityNews](#)
- [Estimates of premature deaths caused by pollution and other causes and... | Download Scientific Diagram \(researchgate.net\)](#)
- [Air pollution causes 800,000 extra deaths a y | EurekAlert!](#)
- [COMEAP: reports and statements - GOV.UK \(www.gov.uk\)](#)

Comments

- Improving air quality is a priority in our Health and Wellbeing Strategy
- Cleaner Air is primarily considered within ETS committee also for HWB due to its impact as a wider determinant on health
- Raise profile of the issue for Board members ahead of consultation on the plan
- Local importance of buses, taxis and deliveries
- Progress made since 2015 AQAP