The Sustainability Series

By The Lancaster West Neighbourhood Team

LANCASTER WEST
NEIGHBOURHOOD TEAM
W11
part of Kensington and Chelsea Council

Air Quality

Dr Hisham Abubakar-Waziri

Agenda

Introduction – 5 mins
Hannah Smith

Presentation – 30 mins
Dr Hisham Abubakar-Waziri

Q&A – 20 mins

Close

Engineering and Physical Sciences Research Council

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THE UNIVERSITY of EDINBURGH

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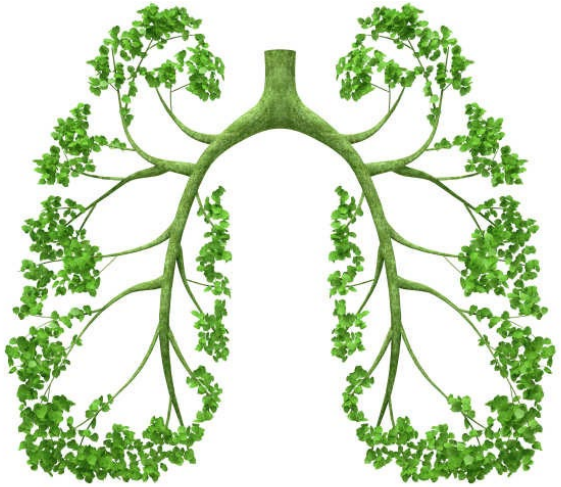


INHALE

Impact of Air Pollution on Health

Dr Hisham Waziri MBBS/BSc MRCP
Clinical Research Fellow in Respiratory Medicine
National Heart and Lung Institute

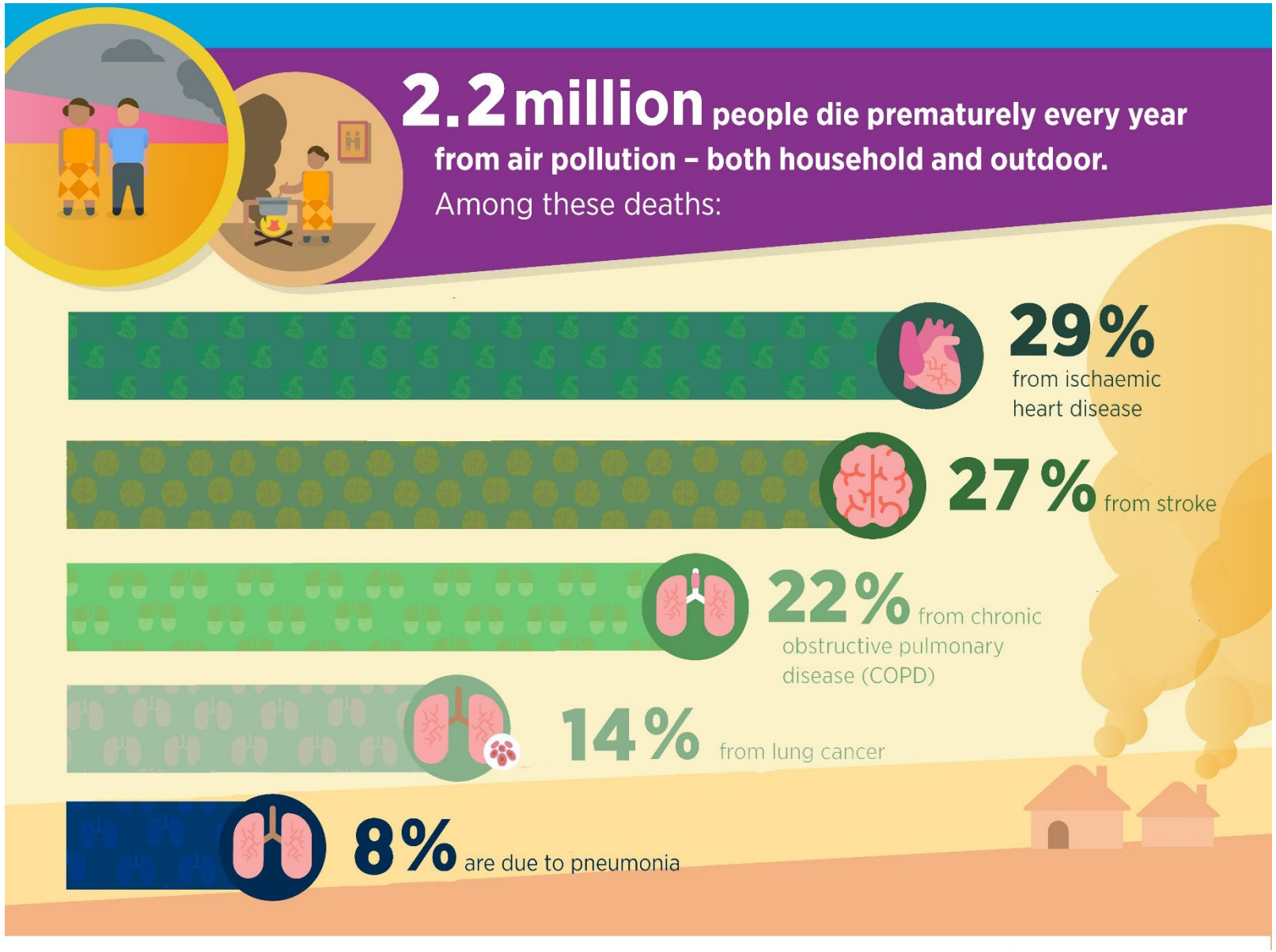
Outline

- Overview of pollution and different types
- Impact of Air Pollution on Health
- What can we do to mitigate Air pollution?
- Project Inhale

What is Air Pollution?

Air pollution is defined as the release of substances into the air that are **harmful** and **poisonous** to the environment and its inhabitants

Global impact of pollution



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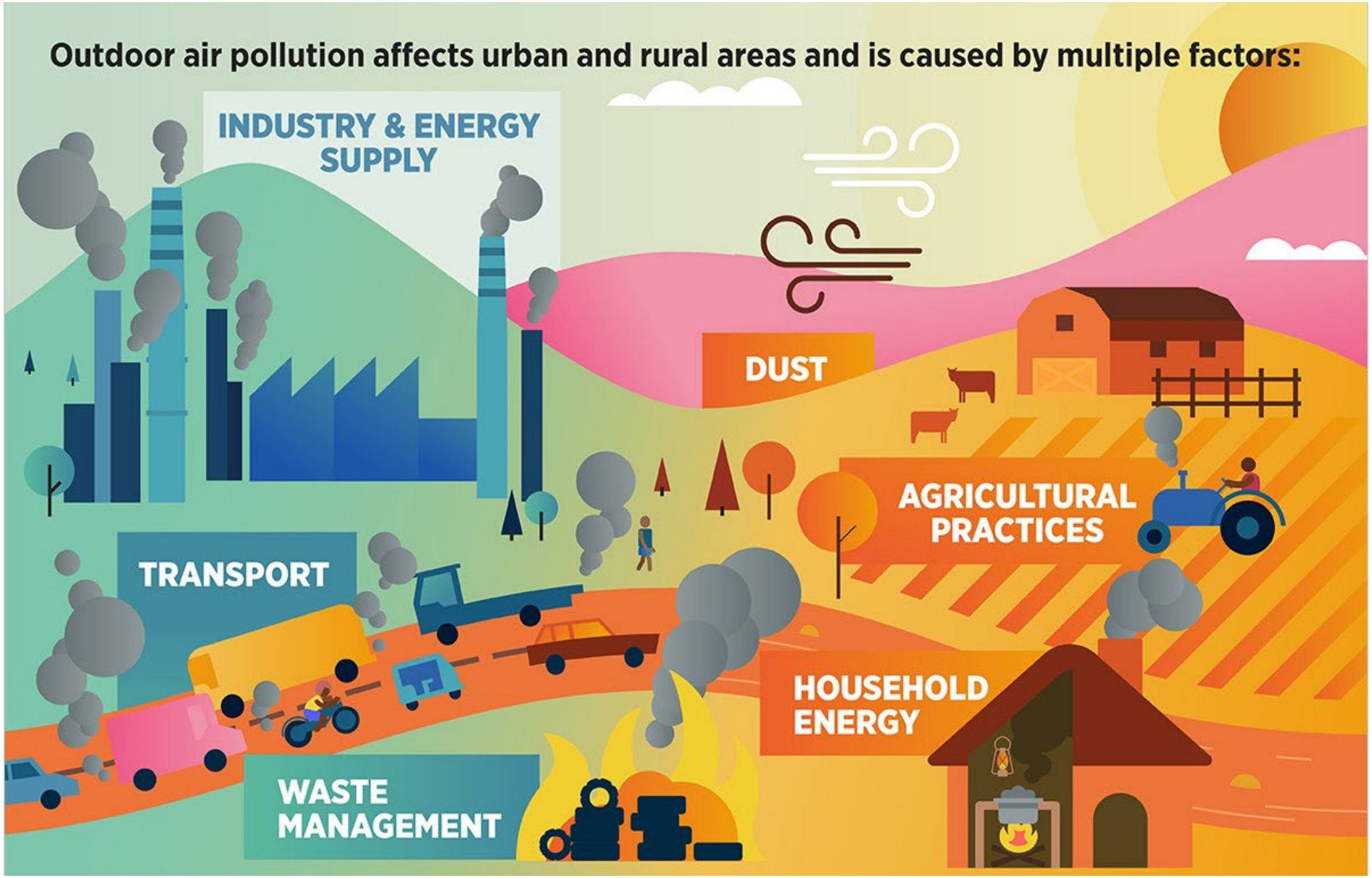
Sources of Air pollution



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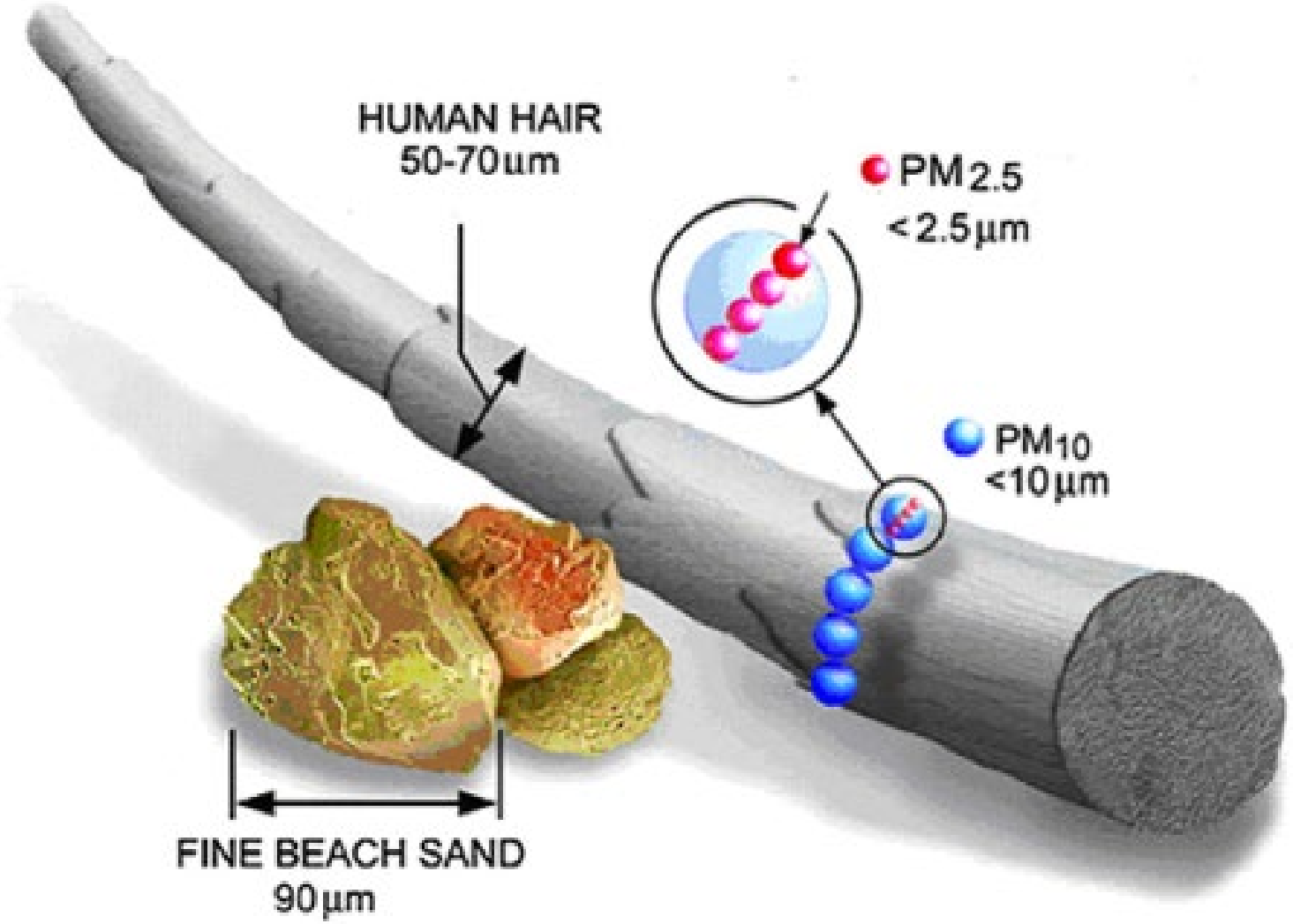
Most Harmful Pollutants

- Particulate Matter (PM10, PM2.5, PM1)
- Nitrogen Dioxide
- Volatile Organic Compounds (VOCs)
- Ozone

Particulate Matter (PM)



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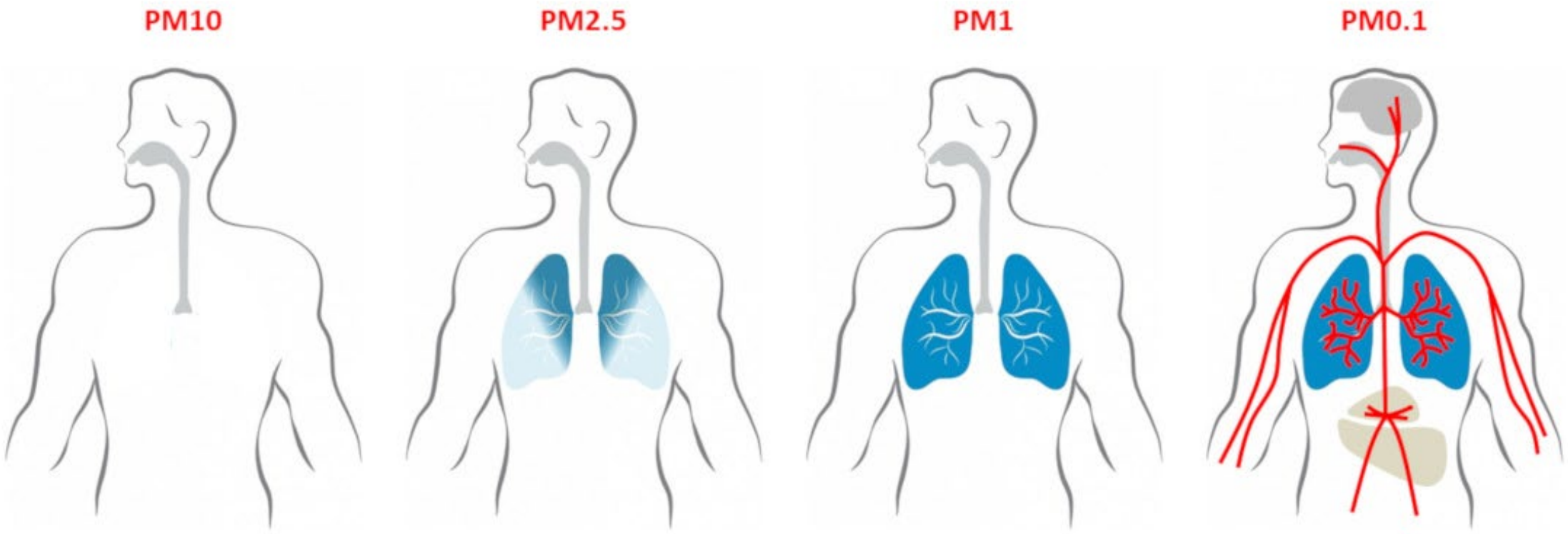
Particulate Matter (PM)



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Nitrogen Dioxide

- Produced mainly by fossil fuel combustion
- Indicator of traffic-related air pollution
- Short term exposures associated with increased airway inflammation and worsened Lung function

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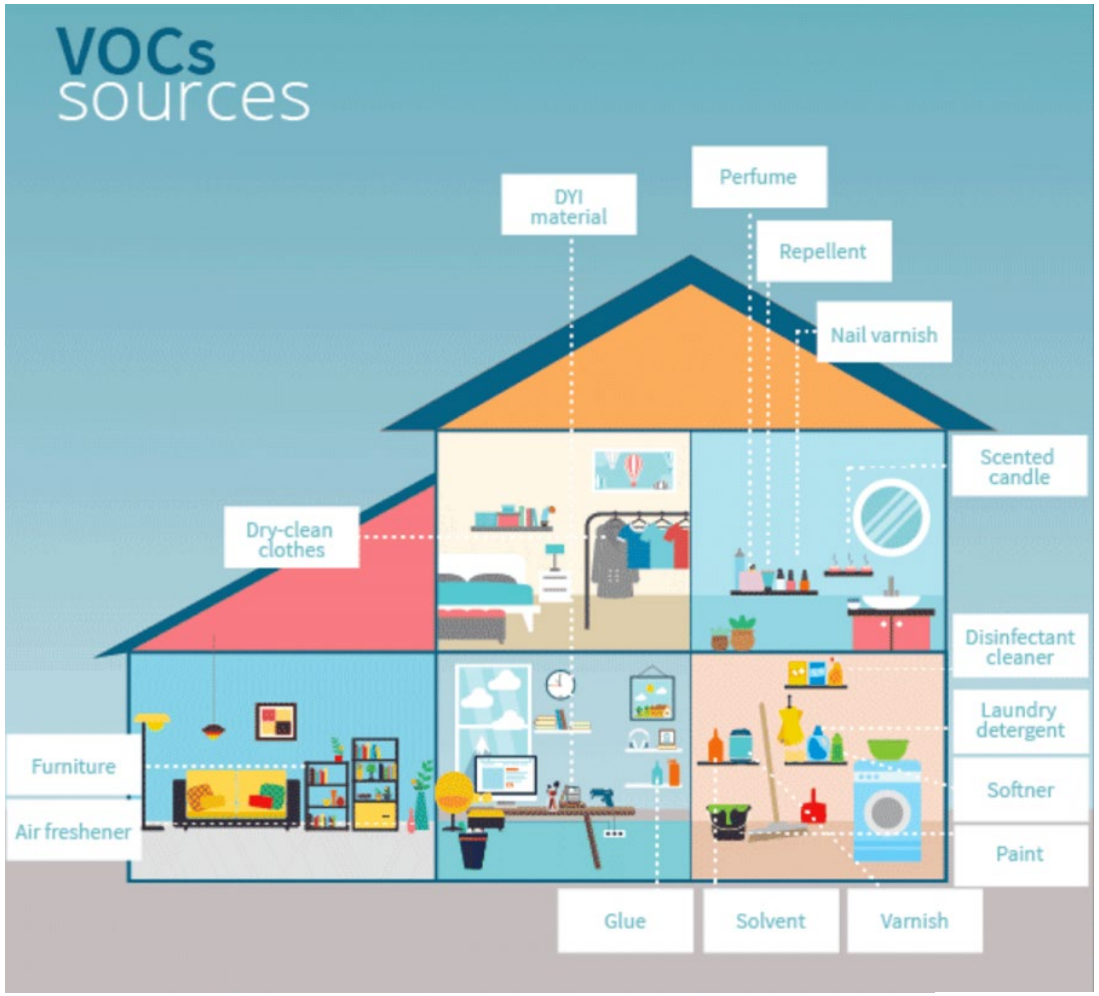
Volatile Organic Compounds

- Organic compounds with high vapour pressure @ room temperature
- Mainly sourced indoors
- Associated with worsened lung function, inflammation



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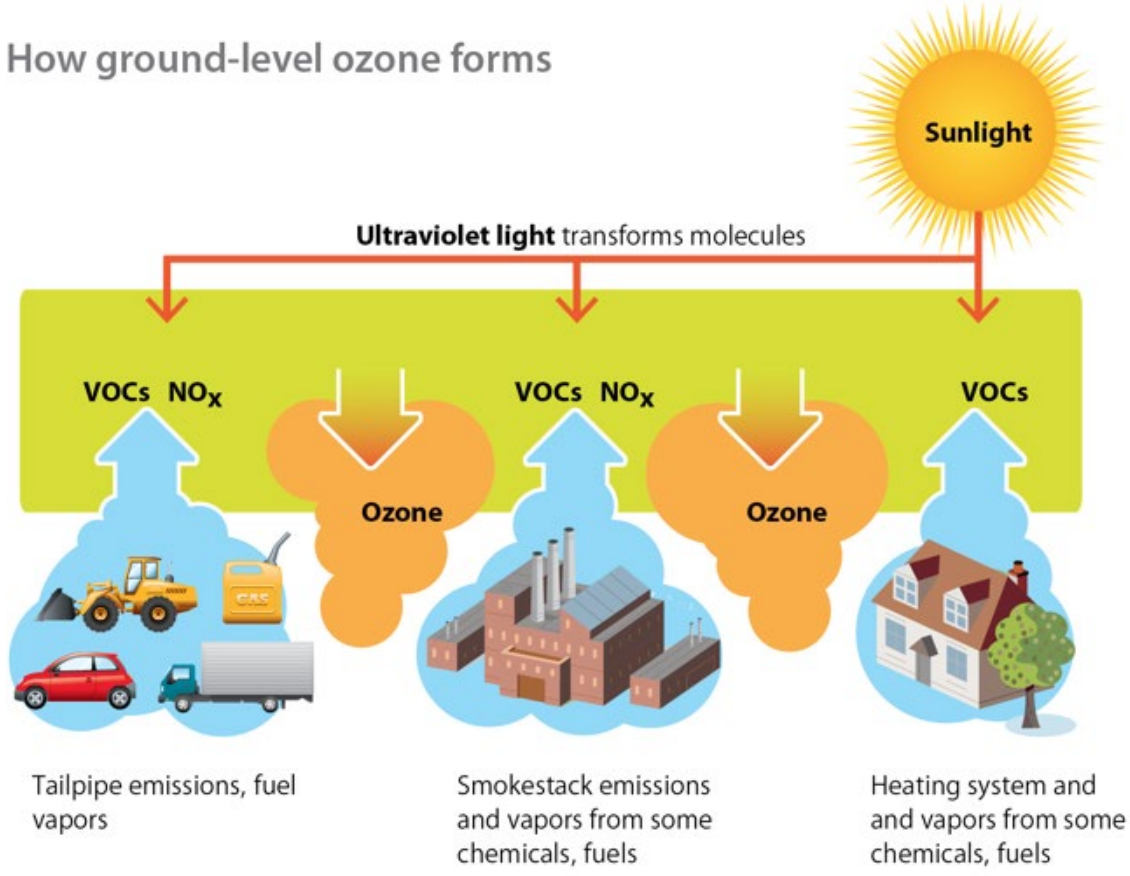
Ozone

- ‘Bad’ Ozone is formed in the trophosphere by photochemical reactions involving VOCs and NOx
- Associated with increased hospital attendances in asthmatics, reduced lung function, Hypertension, tachyarrhythmias



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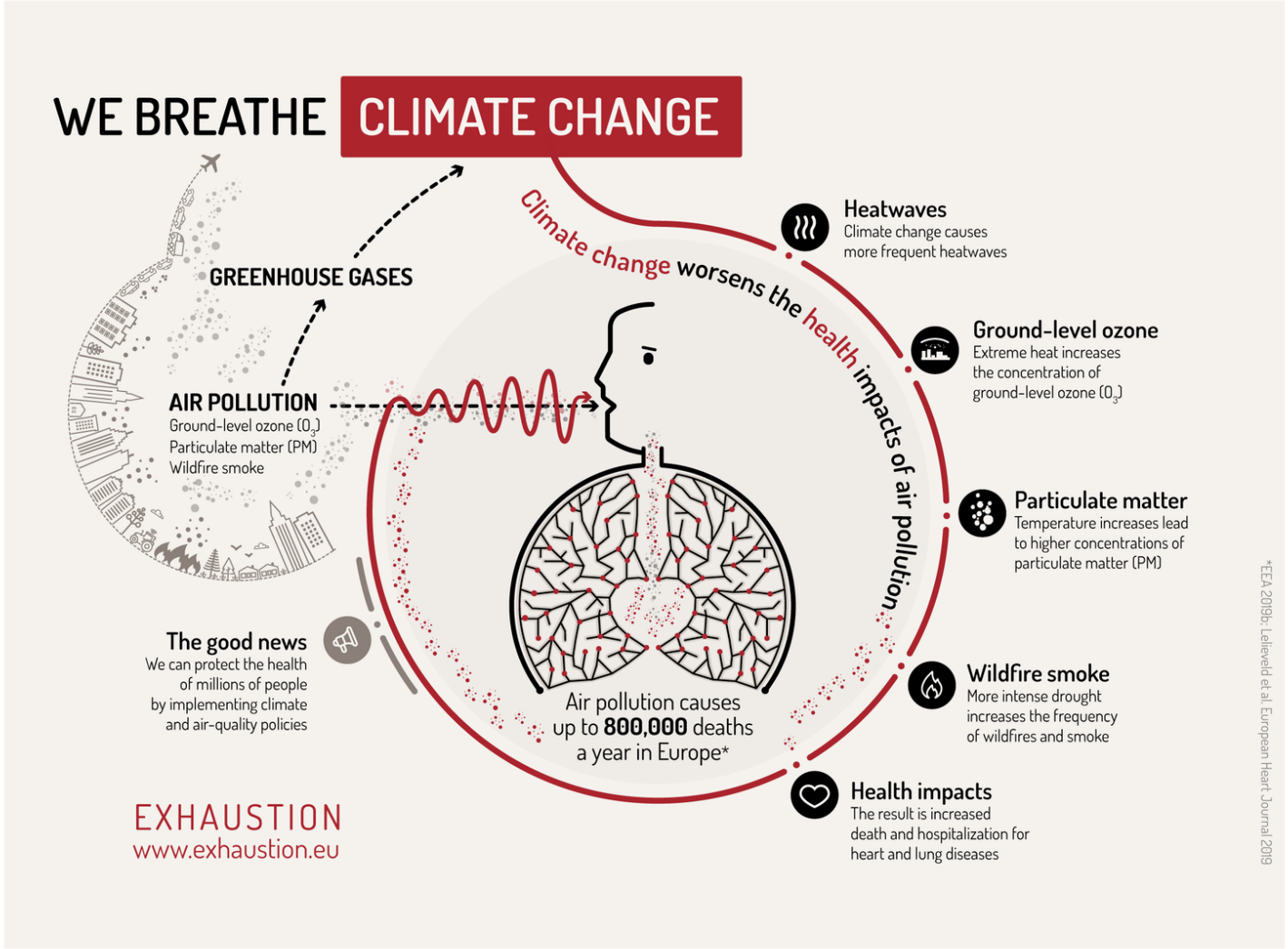
Pollution, Climate Change and Health



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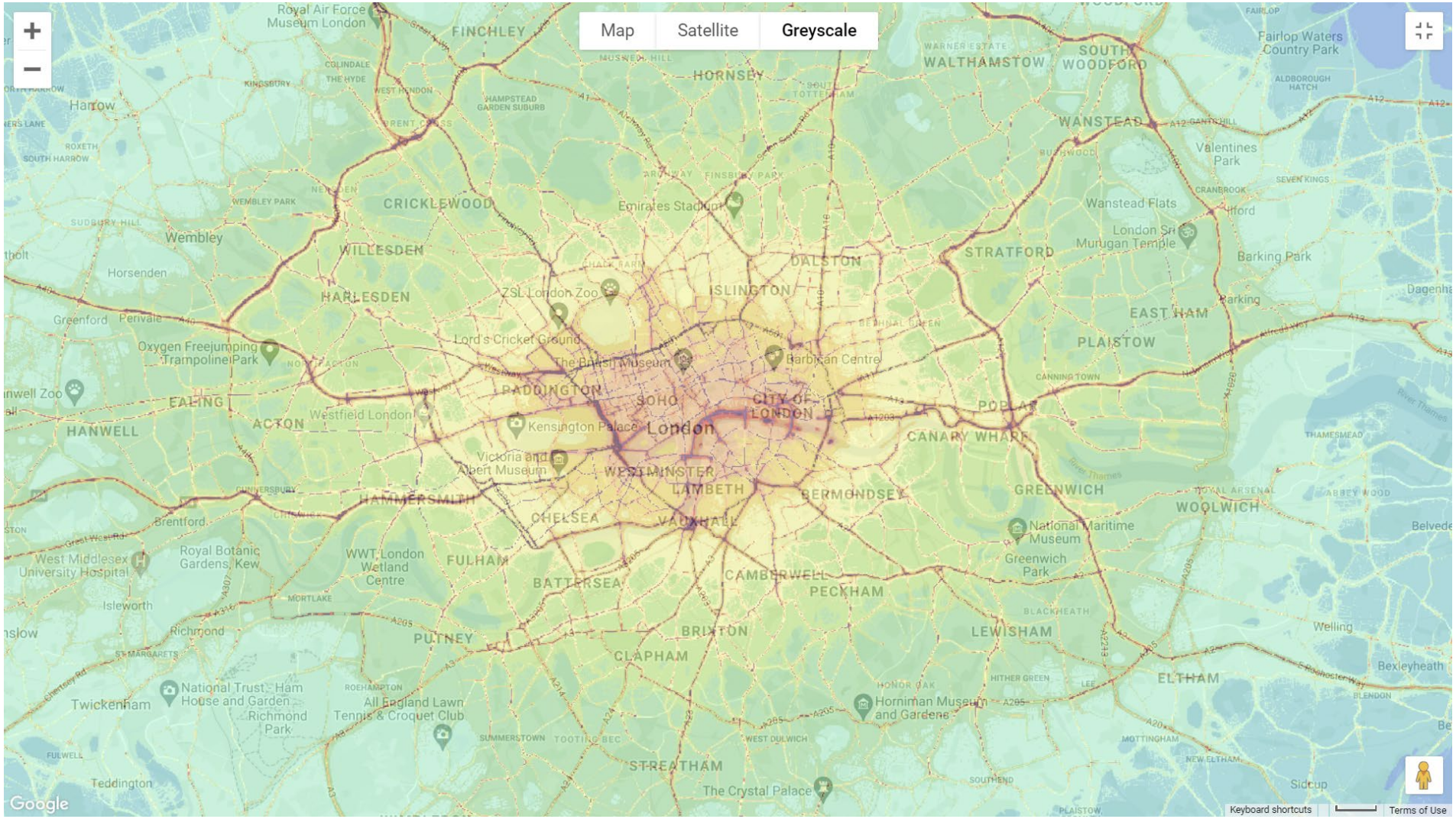
Economic Impact of Air Pollution: London most costly

Table 1 - Top 24 cities with the highest total damage costs of air pollution in 2018

No.	City/urban area	Country	Social costs € mln	No.	City/urban area	Country	Social costs € mln
1	London (greater city)	UK	11,381	13	Sofia	Bulgaria	2,575
2	Bucuresti	Romania	6,345	14	Wien	Austria	2,567
3	Berlin	Germany	5,237	15	Greater Manchester	UK	2,409
4	Warszawa	Poland	4,223	16	Praha	Czechia	2,253
5	Roma	Italy	4,144	17	Barcelona	Spain	2,020
6	Metropolia Silesia	Poland	3,596	18	Torino	Italy	1,815
7	Paris	France	3,505	19	West Midlands urban area	UK	1,807
8	Milano	Italy	3,499	20	Köln	Germany	1,787
9	Madrid	Spain	3,383	21	Bruxelles/Brussel	Belgium	1,586
10	Budapest	Hungary	3,272	22	Kraków	Poland	1,490
11	Hamburg	Germany	2,936	23	Frankfurt am Main	Germany	1,345
12	München	Germany	2,878	24	Zagreb	Croatia	1,312

European Public Health Alliance, 2018

London Suffers from High levels of Traffic Associated Pollution (NO_2)



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WHO guidelines for pollution exposures

Guideline levels for each pollutant ($\mu g/m^3$):		
	1 year	10
	24 h (99th percentile)	25
PM_{10}	1 year	20
	24 h (99th percentile)	50
Ozone, O_3	8 h, daily maximum	100
Nitrogen dioxide, NO_2	**1 yr**	**40**
	1 h	200

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First case with Air pollution recorded as Cause of Death

- 9 year old girl with asthma, in a ground-breaking case.
- Died in February 2013 from acute respiratory failure, having been taken to hospital 27 times over three years
- First case in which exposure to air pollution has been recorded as a medical cause of death.

Ella Adoo-Kissi-Debrah: Air pollution a factor in girl's death, inquest finds

1 day ago

Ella Adoo-Kissi-Debrah lived 25 metres from the South Circular Road in south-east London

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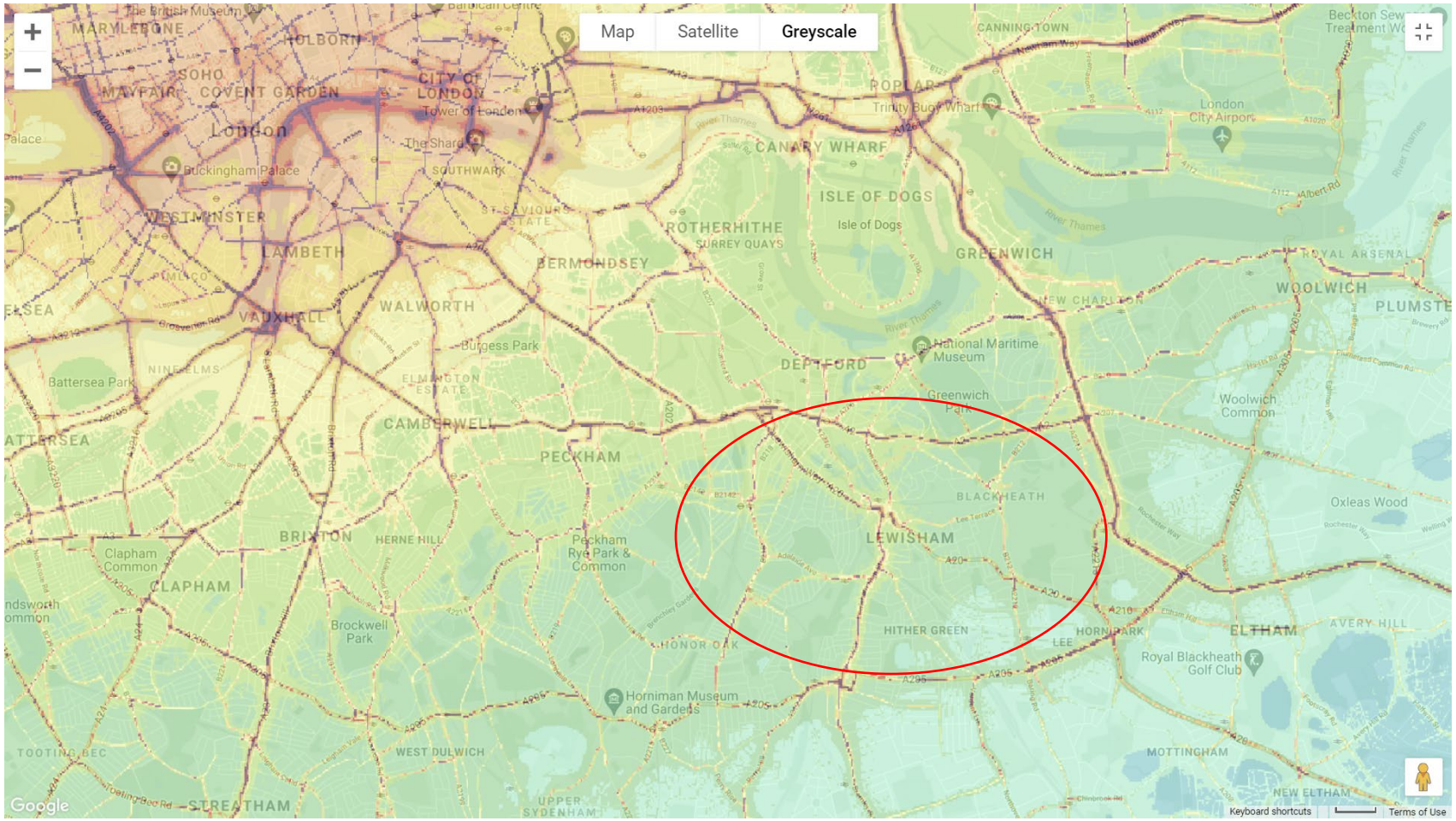
NO2 concentrations in SE London



https://www.londonair.org.uk/

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Record of Inquest

Following an Inquest opened on the 17 December 2019, And an inquest hearing at Main on the 30 November 2020 heard before Philip Barlow in the coroner's area for London Inner South ,

The following is the record of the inquest (including the statutory determination and, where required, findings).

1. Name of Deceased (if known)

   Ella Roberta ADOO KISSI-DEBRAH

2. Medical cause of death

   1a Acute Respiratory Failure

   1b Severe Asthma

   1c Air Pollution exposure

   II

3. How, when and where, and for investigations where section 5(2) of the Coroners and Justice Act 2009 applies, in what circumstances the deceased came by his or her death

Ella Adoo Kissi-Debrah had severe, hypersecretory asthma causing episodes of respiratory and cardiac arrest and requiring frequent emergency hospital admissions. On 15 February 2013 she had a further asthmatic episode at home and was taken to University Hospital Lewisham where she suffered a cardiac arrest from which she could not be resuscitated.

Air Pollution was a significant contributory factor to both the induction and exacerbations of her asthma. During the course of her illness between 2010 and 2013 she was exposed to levels of Nitrogen Dioxide and Particulate Matter in excess of World Health Organization Guidelines. The principal source of her exposure was traffic emissions. During this period there was a recognized failure to reduce the level of NO2 to within the limits set by EU and domestic law which possibly contributed to her death.

Ella's mother was not given information about the health risks of air pollution and its potential to exacerbate asthma. If she had been given this information she would have taken steps which might have prevented Ella's death.

4. Conclusion of the Coroner as to the death

   Died of asthma contributed to by exposure to excessive air pollution

5. Further particulars required by the Births and Death Registration Act 1953 to be registered concerning the death

(a) Date and place of birth
24/01/2004

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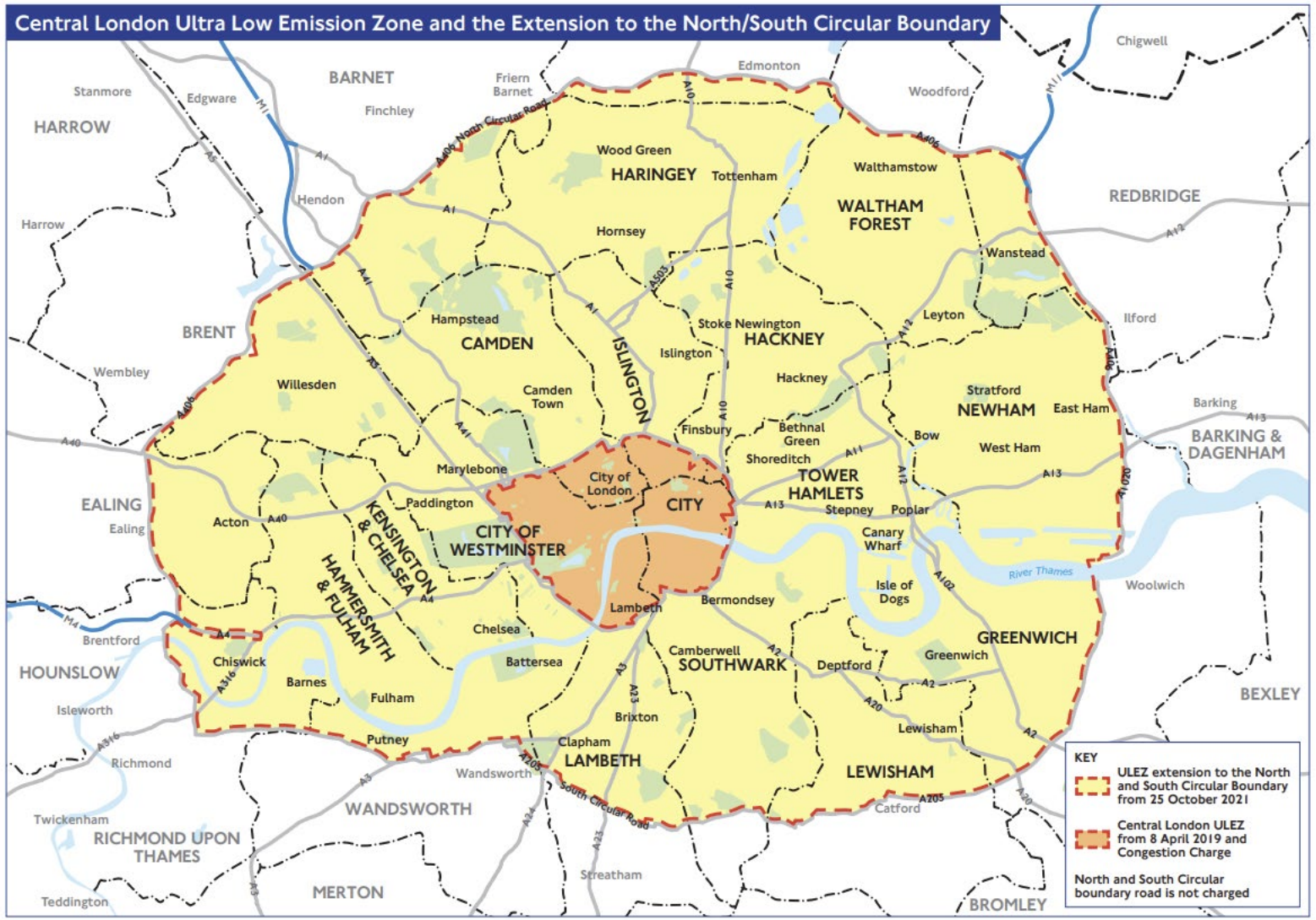
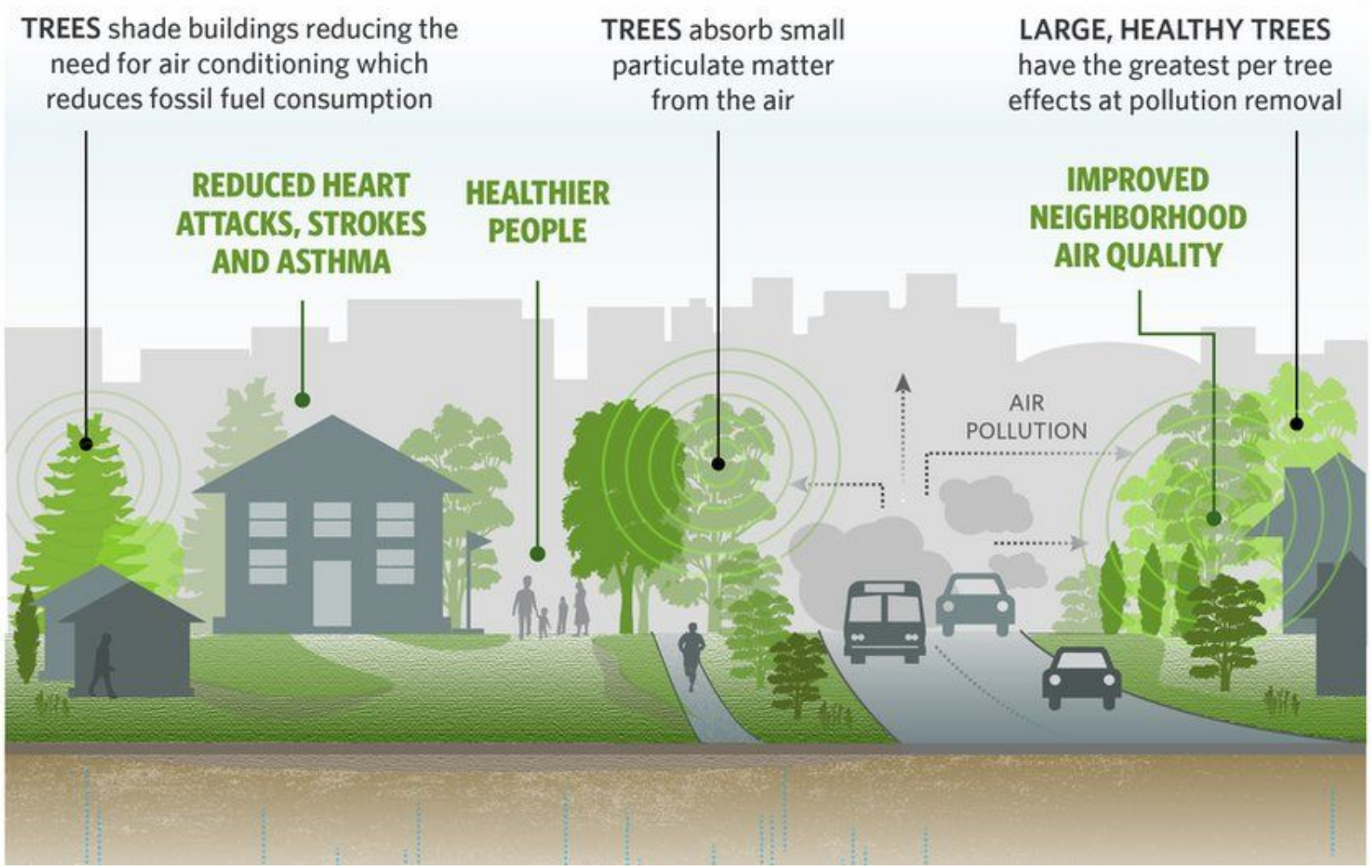
How can we Reduce Air Pollution?

Schematic from the BBC

Expansion of ULEZ from Oct 2019



Utilise Green Infrastructure



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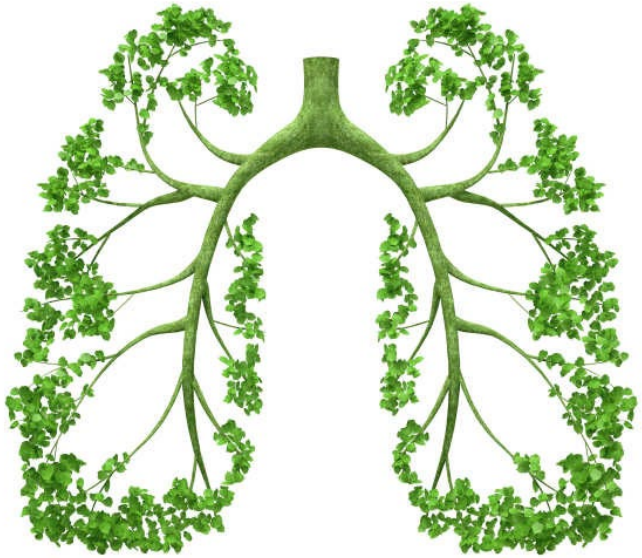
Rationale for INHALE

- Research needed to improve our understanding on how pollution affects health
- Personalised monitoring can help determine individual susceptibility by relating personal exposure to personal health outcome measures.
- May enable us to predict who will be at risk and allow us to assess the impact of green infrastructures



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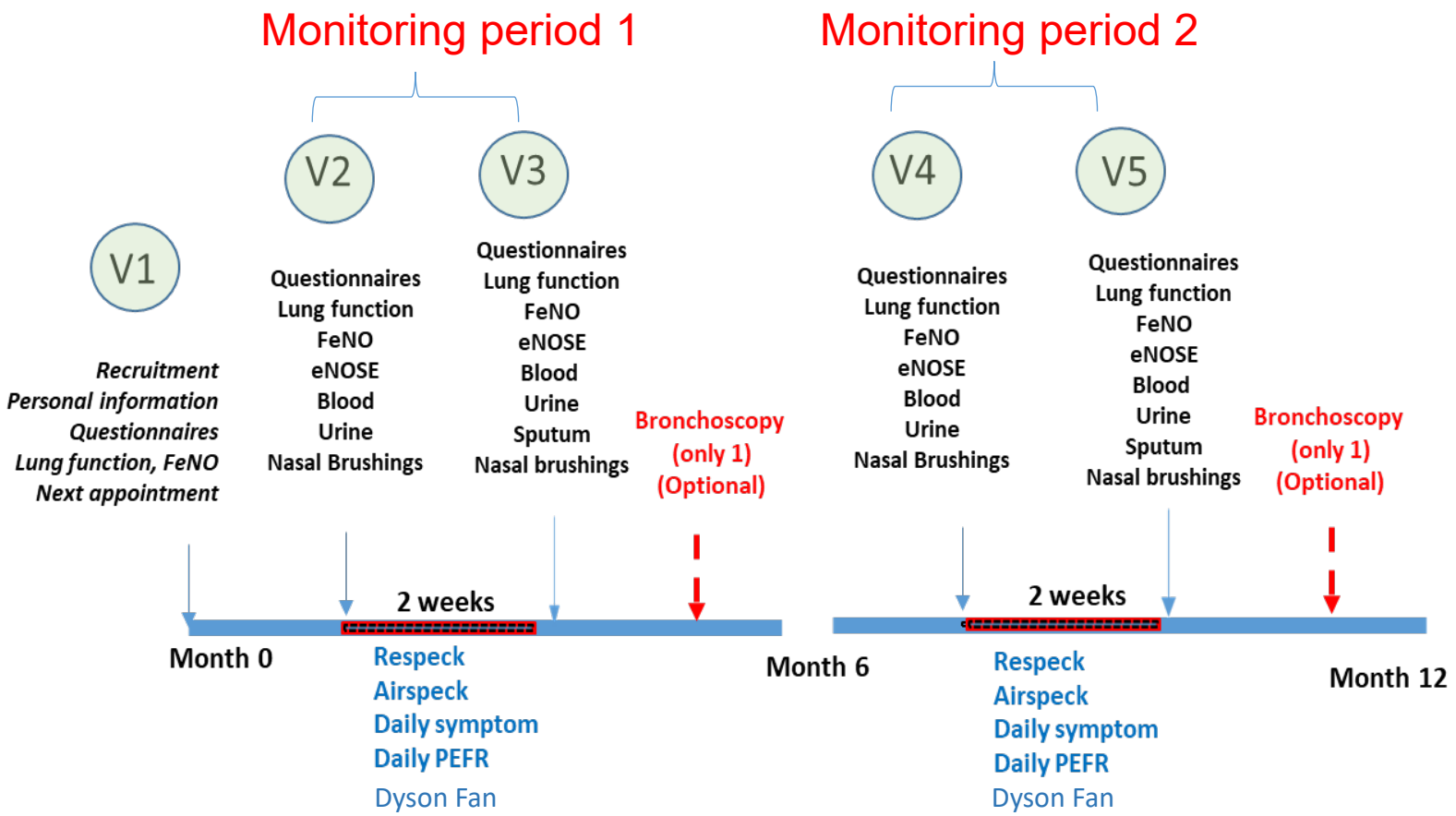
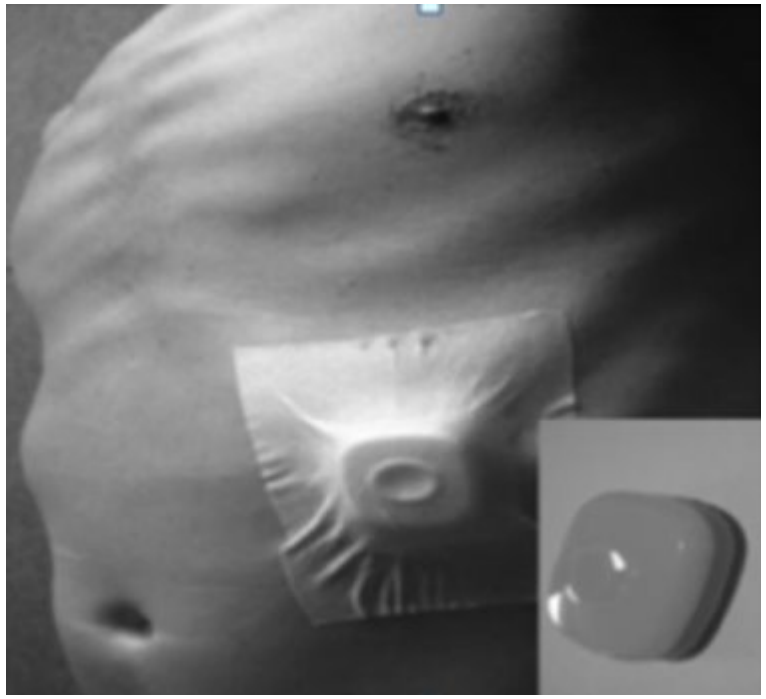
Study Design



How do we monitor personal pollution exposures?



Respeck

Airspeck

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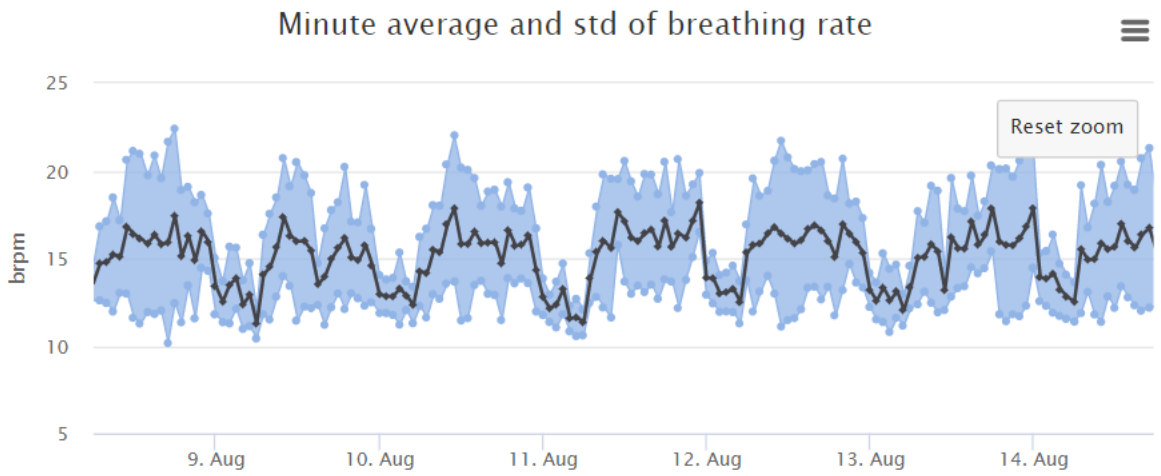
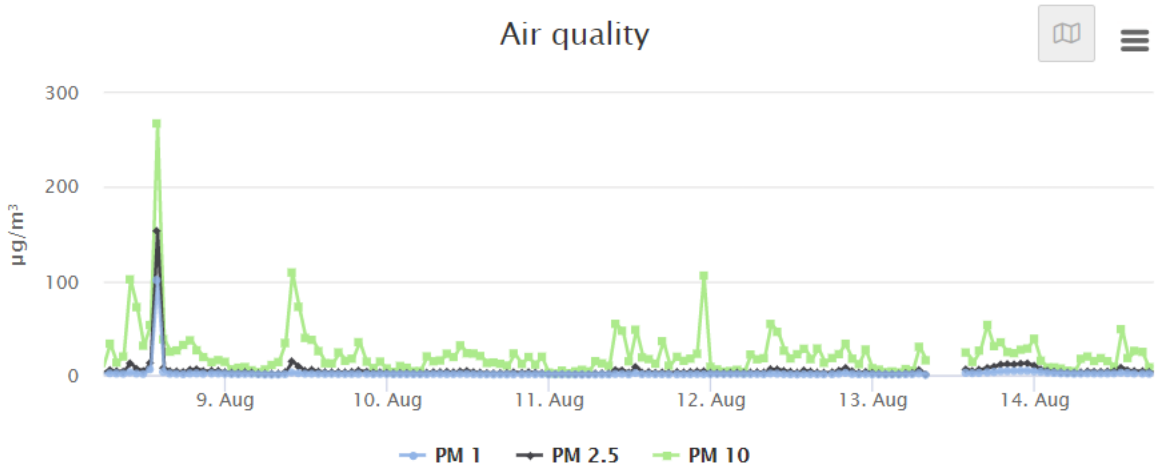
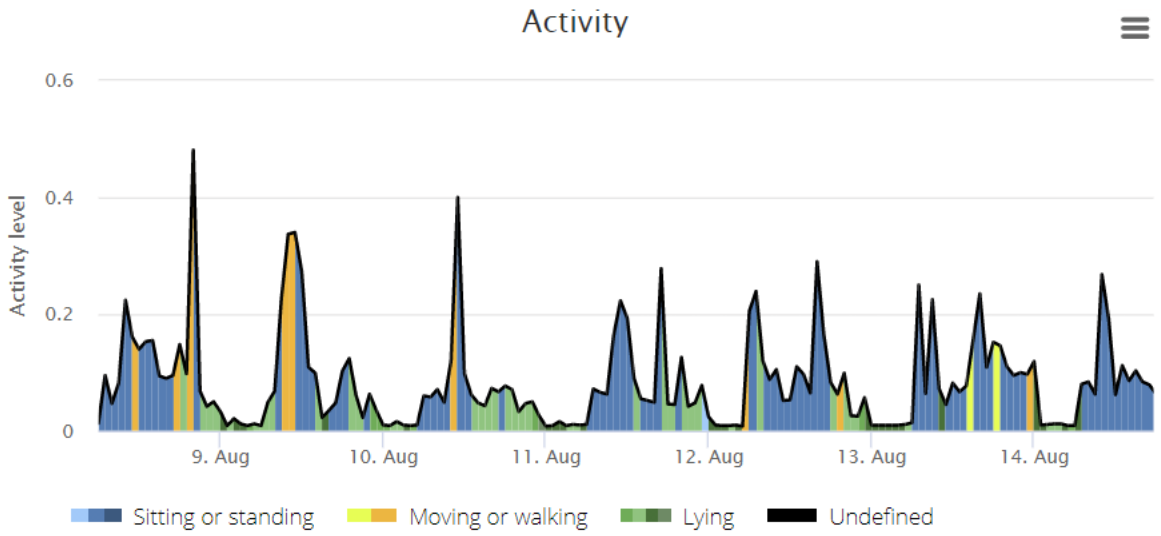
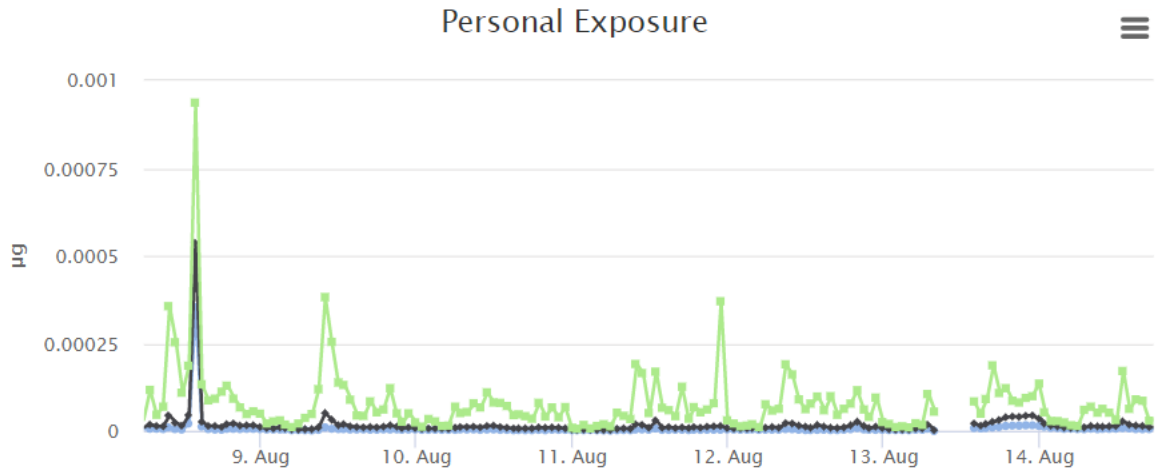
What are we Measuring?









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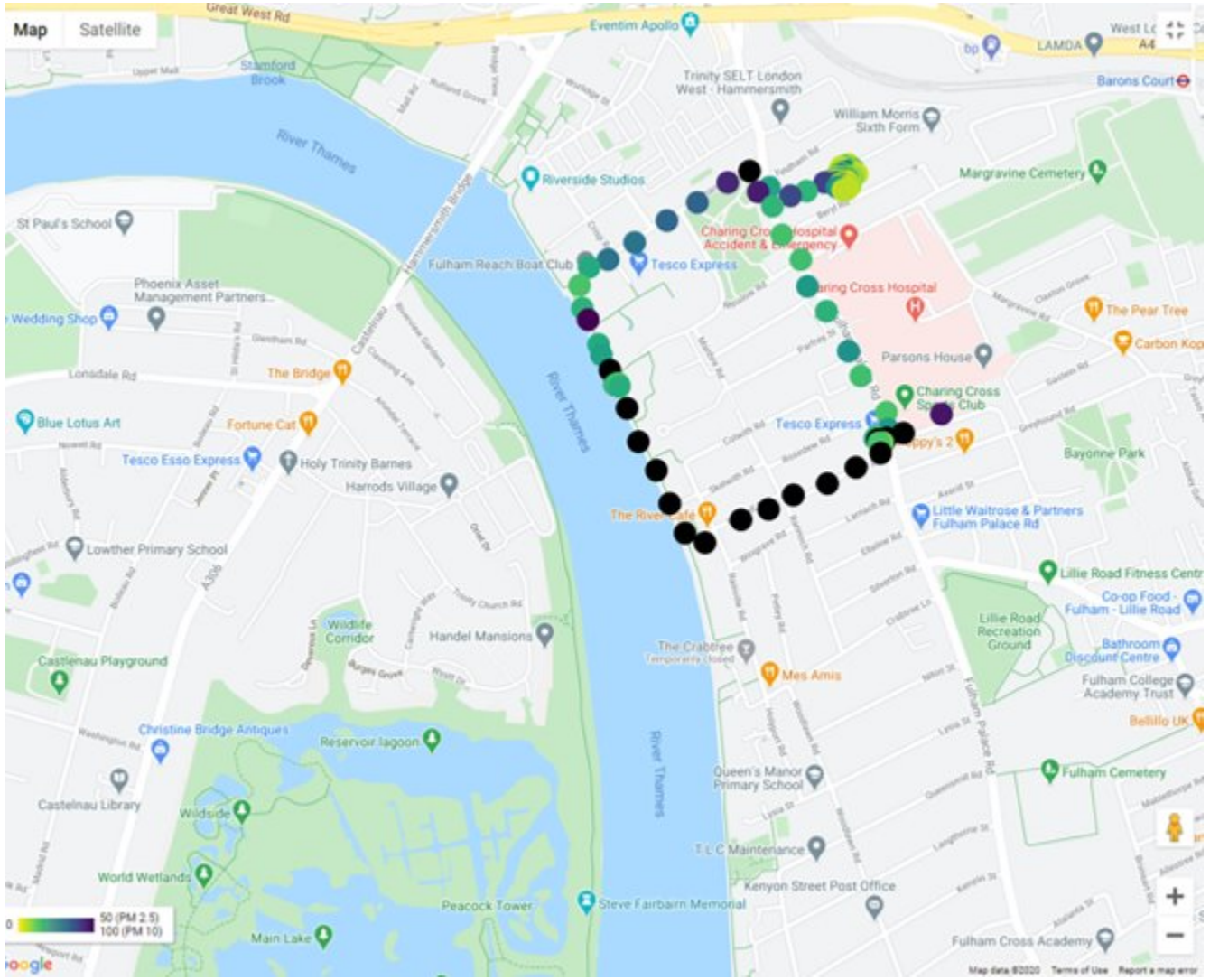
What are we Measuring?



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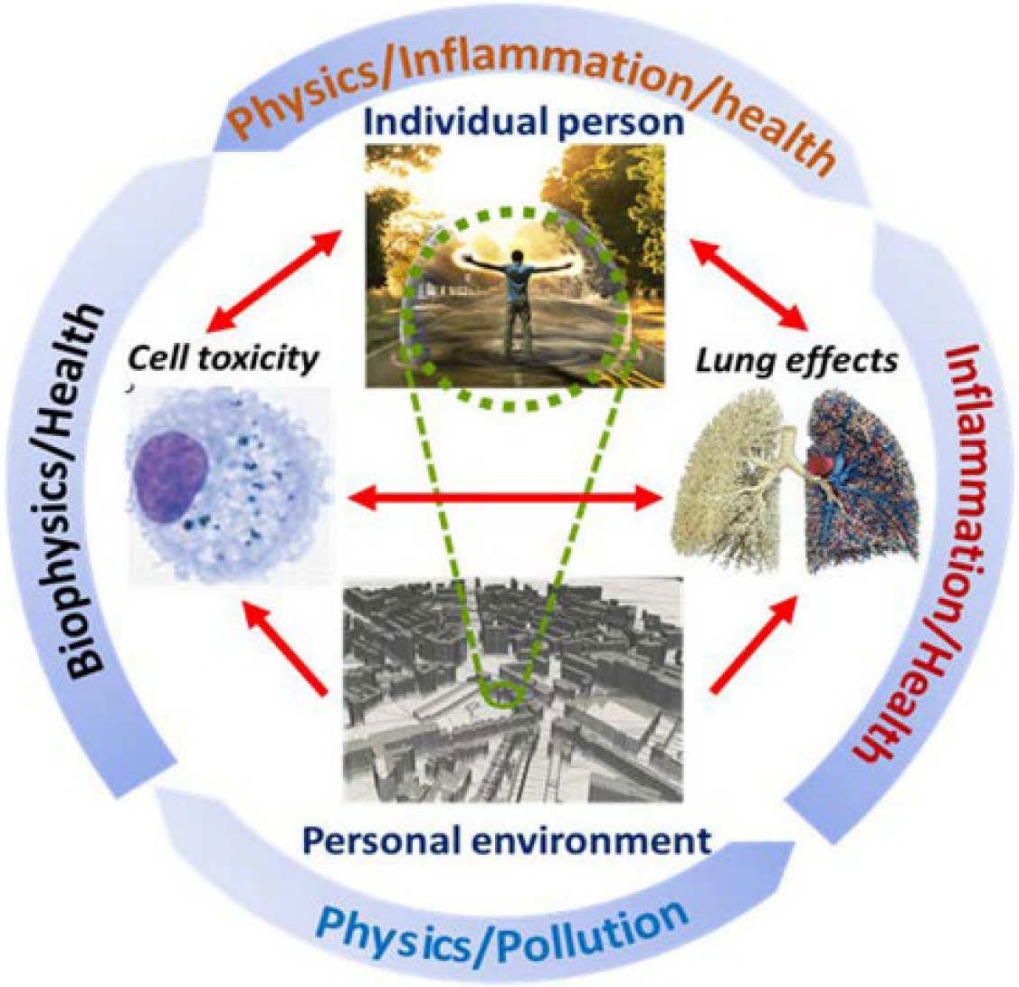
Aim of Project Inhale



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Summary and Conclusions

- Air Pollution is a major contributor to the global burden of disease
- Air Pollution accelerates the impact of climate change, which in turn will increase the health impact of air pollution
- Urgent need to reduce pollution to more sustainable levels
- Improving our knowledge of the impact of pollution on our health can help us identify how to best do this

Acknowledgements

Thank you for Listening

Project Manager Claire Dilliway
National Hear and Lung Institute – Prof Chung and Team
School of informatics at Edinburgh – Prof DK Arvind and Team
Royal School of Mines – Prof Alex Porter and Team
Imperial College Dept of Earth Science and Engineering – Dr Chris Pain and Team

Asthma volunteers needed for INHALE study

We are looking for subjects with asthma, aged between 20 and 75, for participation in a study where we are examining the degree of exposure to environmental pollution and its potential effect on your asthma.

This study involves wearing a monitor and providing samples of blood, urine and sputum (phlegm).

You should be a resident and work or study in the West London area.

If you are interested or would like more information, please contact:

Ms Sally Meah
in Respiratory Research Unit
at the Royal Brompton Hospital
Tel: 0207 351 8935 or **e-mail:** sally.meah@imperial.ac.uk

This study has been approved by the Dulwich Research Ethics Committee.

You will be reimbursed for reasonable expenses incurred whilst participating in this study.

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Version 1.3 11/05/2021

Healthy volunteers needed for INHALE study

We are looking for healthy volunteers, aged between 20 and 75, for participation in a study where we are examining the degree of exposure to environmental pollution and the potential effect of the pollution on your lungs.

This study involves wearing a monitor and providing samples of blood, urine and sputum (phlegm).

You should be a resident and work or study in the West London area.

If you are interested or would like more information, please contact:

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Any Questions?