How dispersion modelling can help cities to reduce air pollution

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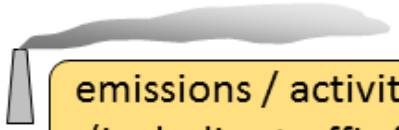
How data can supercharge efforts to lower air pollution in cities

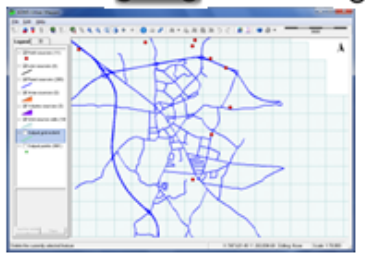
9 February 2021

ADMS-Urban: Atmospheric Dispersion Modelling System

meteorological data



emissions / activity data (including traffic flows)



source data

background concentrations

time-varying emission profiles

ADMS-Urban

- dispersion
- met. pre-processor
- regional model link
- chemistry
- deposition
- street canyons
- urban canopy
- tunnels
- elevated roads
- buildings
- complex terrain

high resolution pollution maps

annual averages, exceedences, percentiles, hourly means

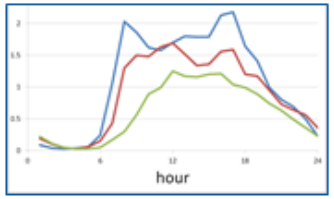
comparison with monitoring data

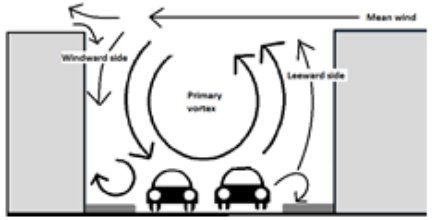
comparison with air quality standards

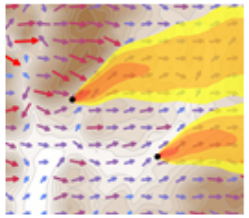
source apportionment, footprints

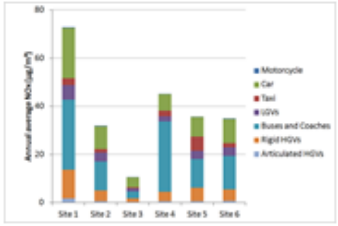
future scenarios

traffic management



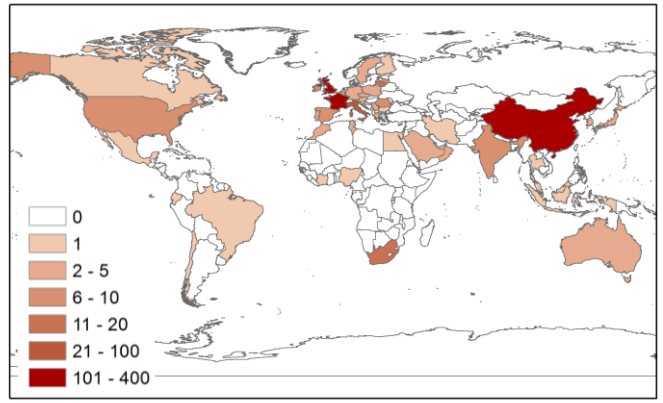






Hundreds of ADMS licences worldwide

Organisations using ADMS per country



Widely used by…

- Companies
- Regulatory bodies
- Local government
- National government
- Research organisations

Provided with…

- Professional Helpdesk Service
- Training (online available)
- Detailed user documentation

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www.cerc.co.uk/ADMS-Urban

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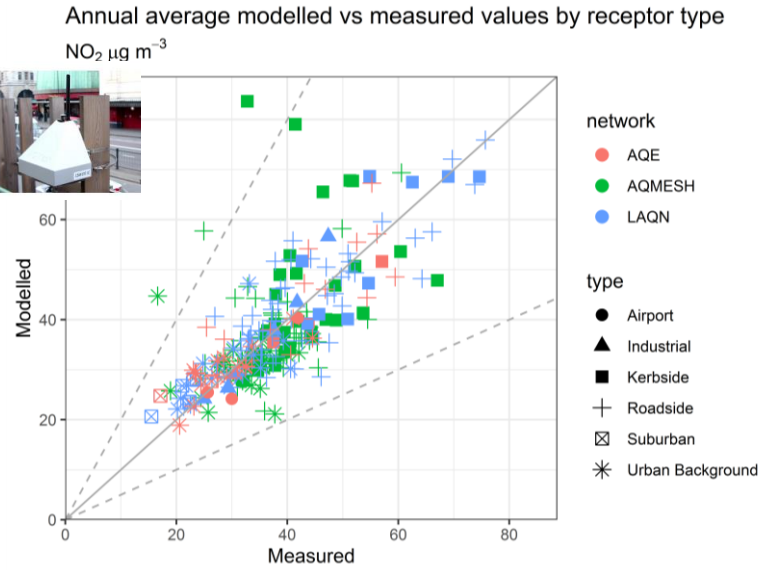
Using the ADMS-Urban dispersion model to reduce air pollution

1. Collect model input data

Verify that model predictions are accurate for the city

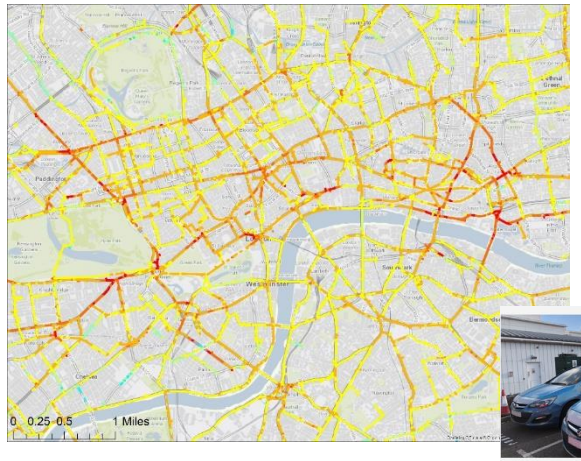
2. Predict concentrations at measurement locations



3. Refine model setup to improve agreement with measurements

4. Apply the model to understand the problem and find the most effective solutions

Model simulation of the BL pilot hyperlocal mobile measurements



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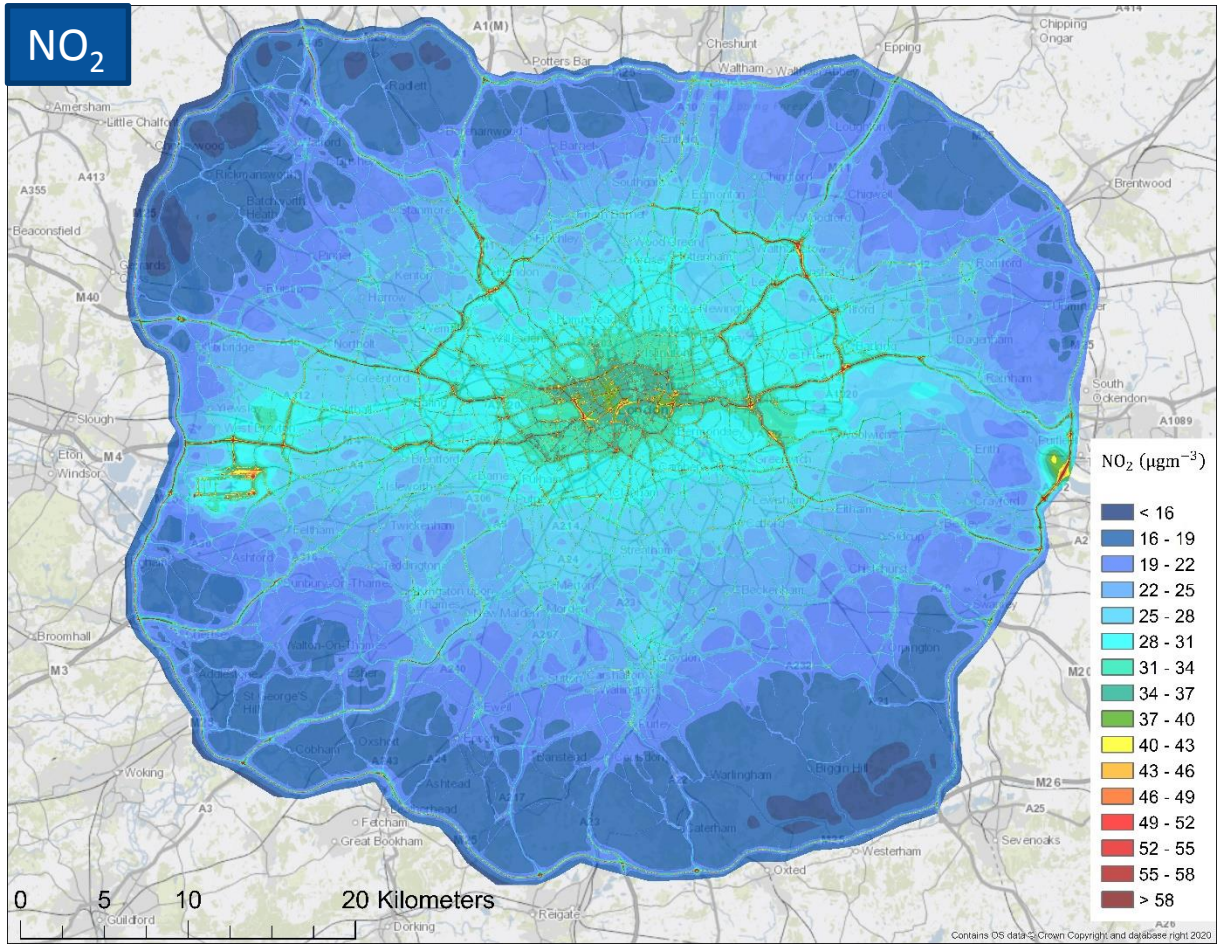
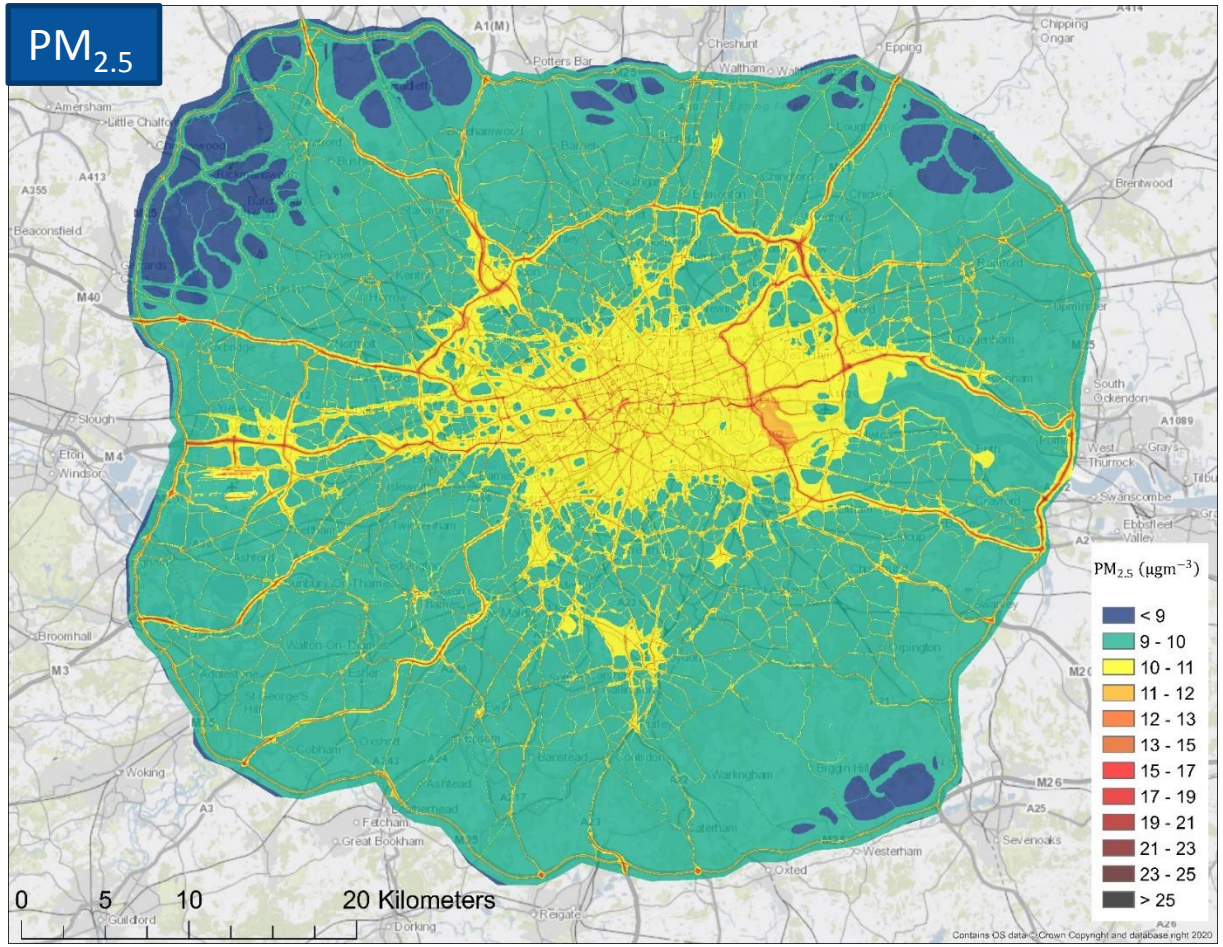
Understand the problem: Model gives air pollution levels everywhere, all the time

Modelled air pollution in London in 2019 with a resolution of 10 metres



Area coloured yellow, orange and red exceeds UK annual objective of 40 µg/m³ for NO_2



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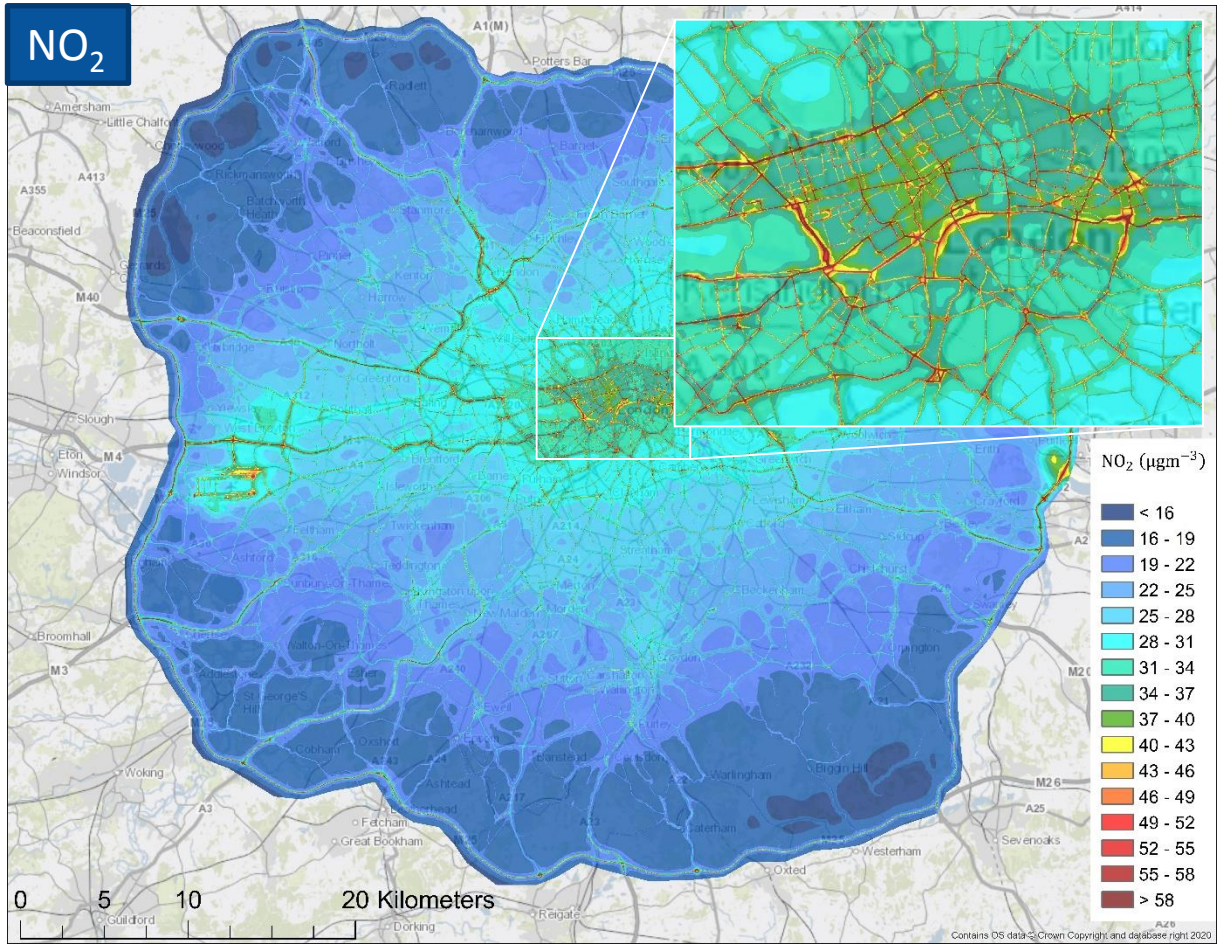

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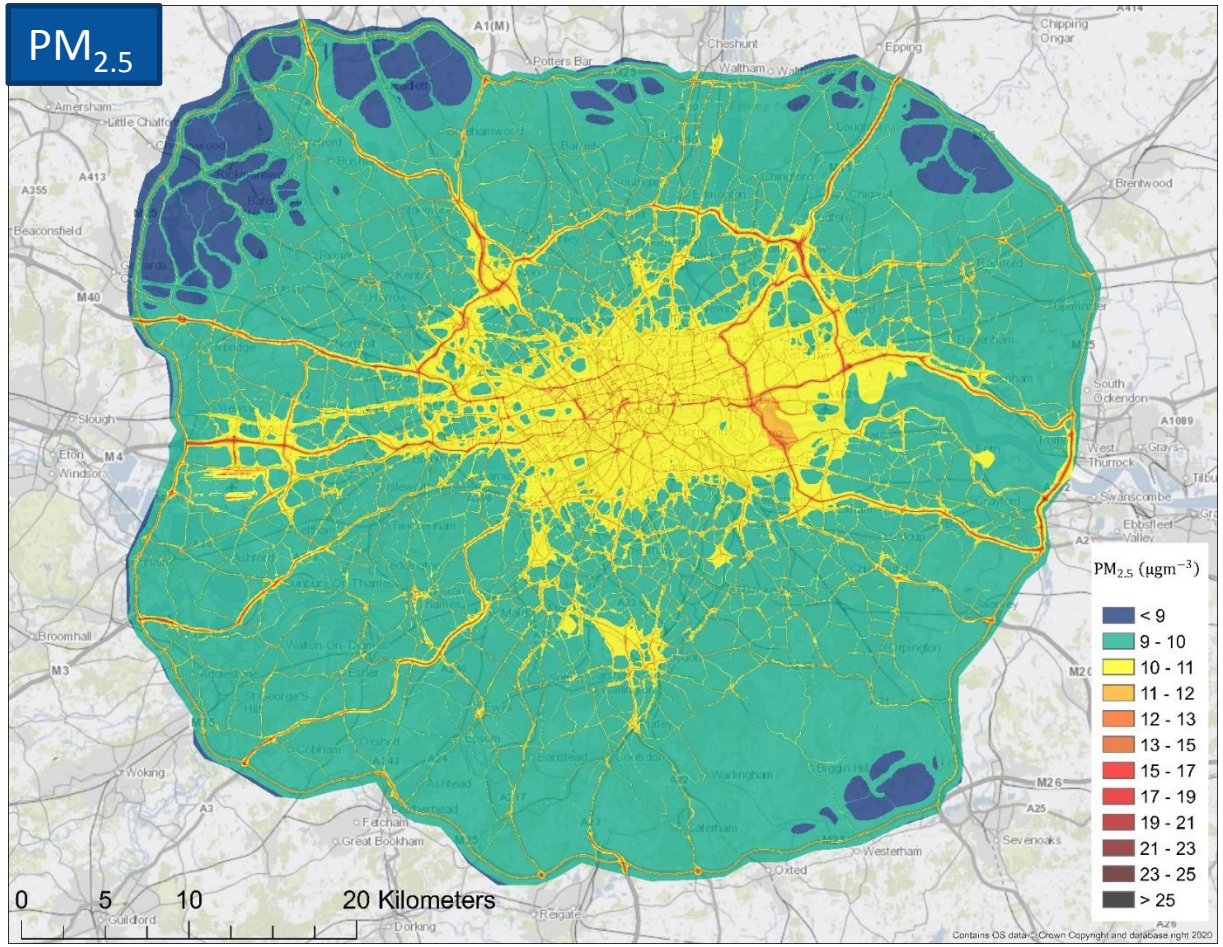

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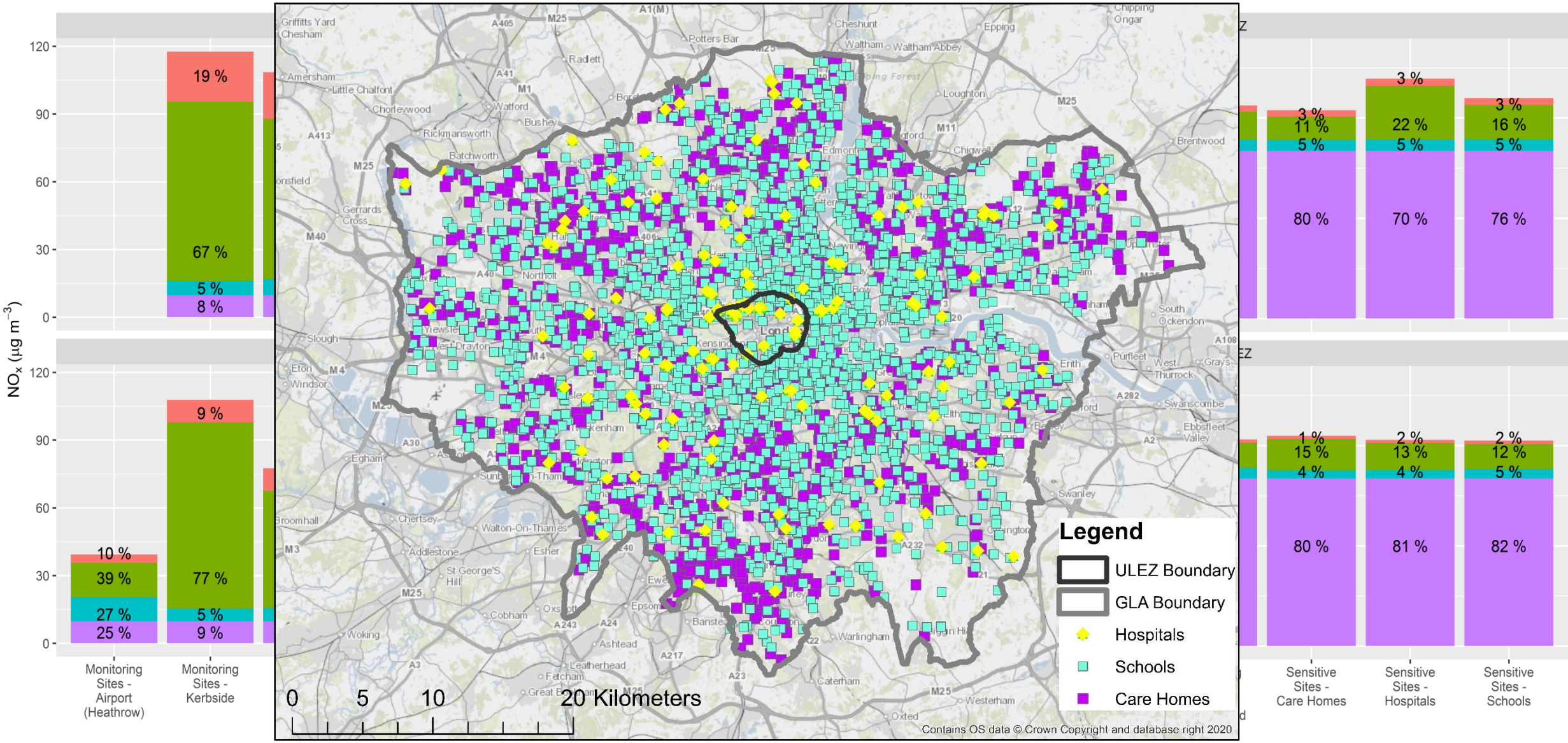
Modelling helps us understand the causes of air pollution



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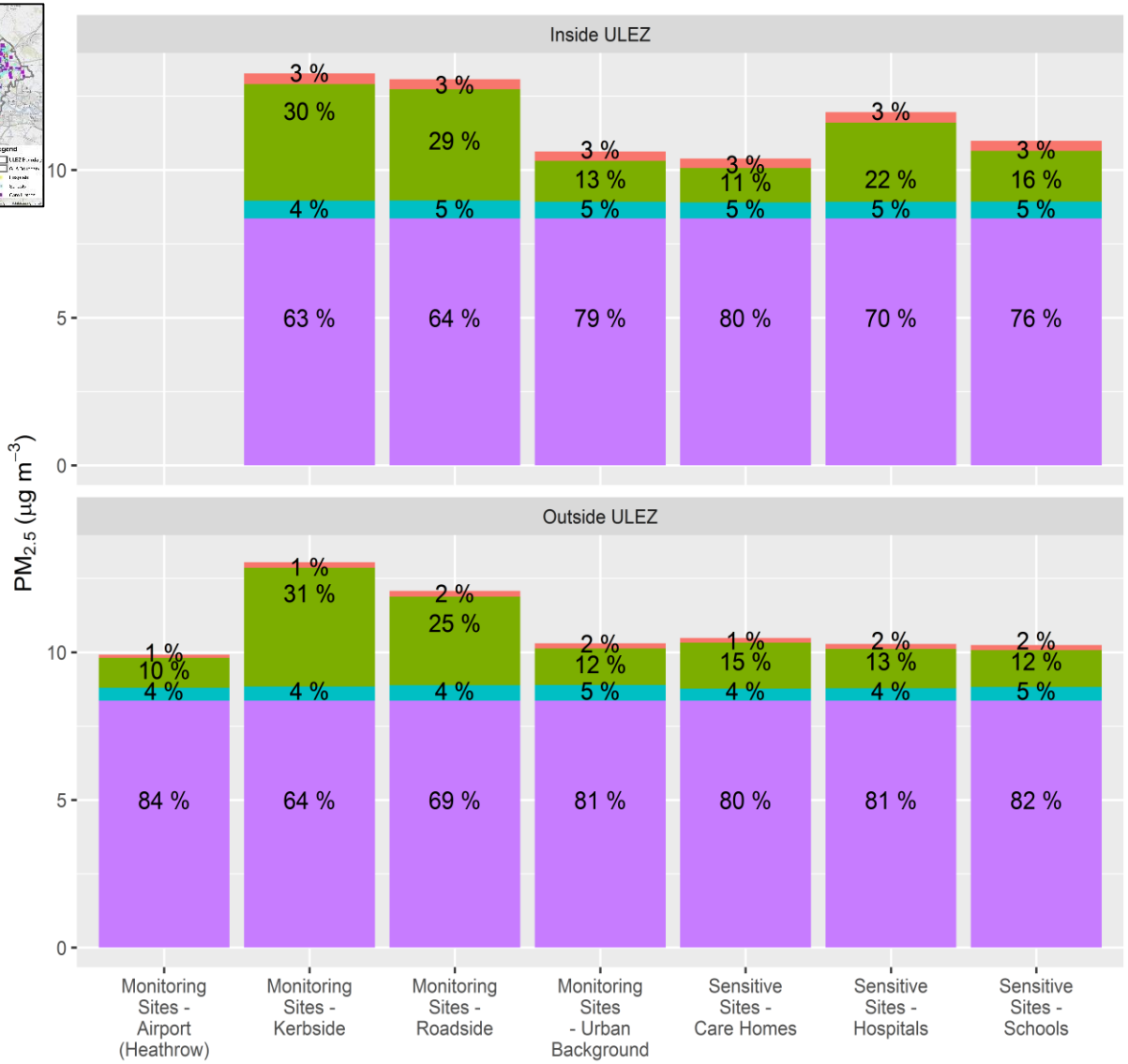

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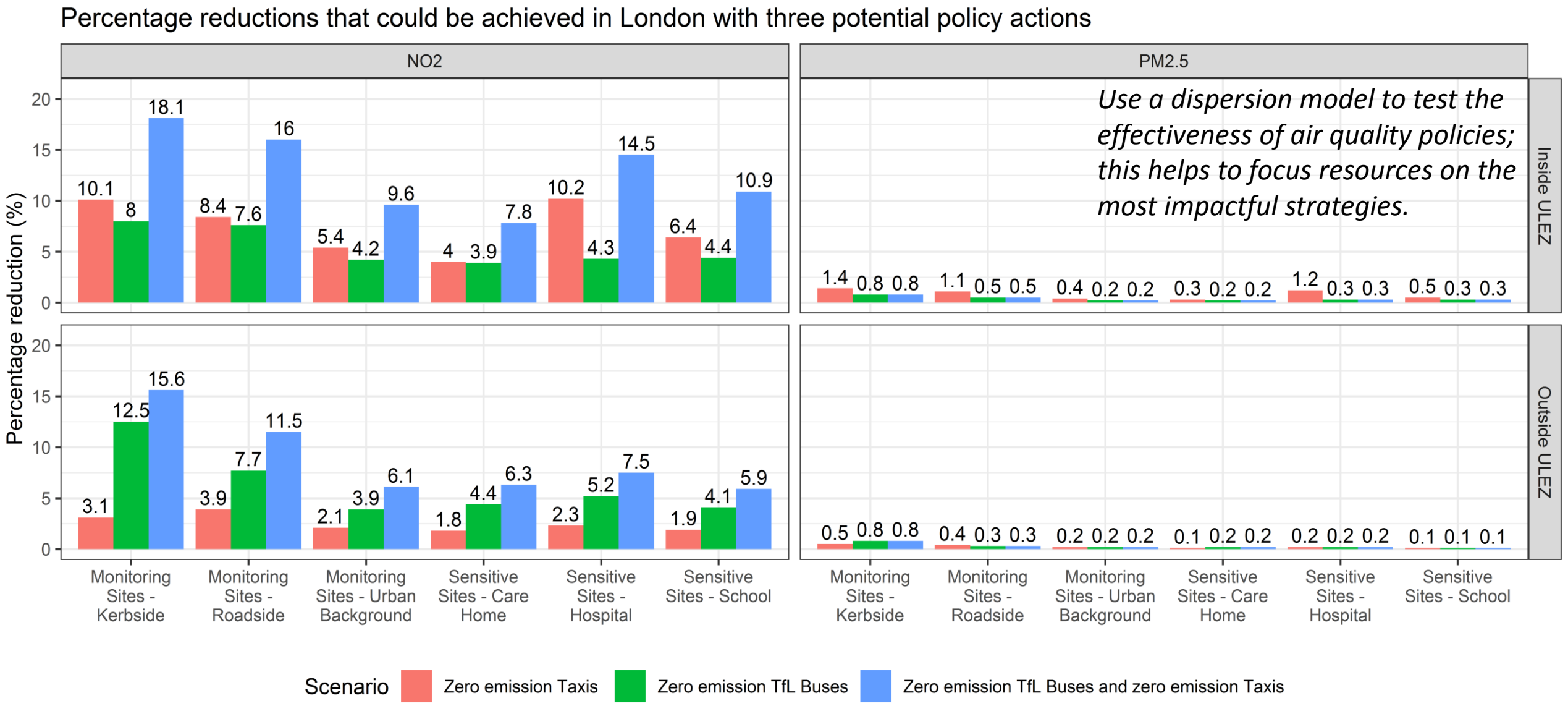
Modelling allows us to test the effectiveness of air quality policies



Important lessons learned in Breathe London

Dispersion modelling can help your team to understand your measurements, which will be influenced by meteorology, the position of the sensor, proximity to pollution sources and the surrounding urban morphology (e.g. street canyons)

Comparing lower cost sensor measurements with dispersion model data can be helpful for your measurement experts, for example to identify if a sensor is failing

With careful calibration, lower cost sensors can provide the measurements needed to verify dispersion model results; sensors can help identify pollution hotspots to improve emissions for input to dispersion models

Having dispersion modellers on your team is important – understanding the physical processes that drive air pollution is crucial for success