Stationary sensor network

Deployment overview

AQMesh pods were deployed across the city on lampposts and buildings.

The Breathe London stationary air pollution monitoring network was made up of AQMesh pods (manufactured by Environmental Instruments Ltd) installed at 100 locations across London. The stationary sensor network collected data from 1 November 2018 to 30 November 2020. Each pod contained several air quality sensors that provided near real-time (available on-line within one hour of measurement) local air quality information and CO_2 (see **Table 1**). The pods also measured temperature, humidity, and air pressure to correct for environmental conditions. Sensors measuring gaseous pollutants were set to collect data continuously for 10-second intervals, while particulate matter (PM) sensors operated 30-seconds in each minute, and create an overall average every 1-15 minutes. Data was presented on the Breathe London website as current, hourly averages and averages over the entire deployment period for each pod.

TABLE 1. Pollutants measured by the Breathe London stationary network and sensor types

Pollutant	Sensor Type
Nitrogen dioxide (NO_2)	Electrochemical sensor
Nitric oxide (NO)	Electrochemical sensor
Particulate matter (including $PM_{2.5}$ and PM_{10})	Light-scattering optical particle counter
Carbon dioxide (CO_2)	Non-dispersive infrared absorbance sensor
Ozone (O_3)*	Electrochemical sensor

*Only 10 pods were equipped with electrochemical sensors to measure ozone.

Mobile mapping

Deployment overview

Credit: ACOEM Air Monitors

The mobile mapping campaign was conducted by two Google Street View cars equipped with reference-grade air quality sensors, that measured air pollution over approximately 40,000 km of driving between August 2018 and October 2019. The fast-response, reference-grade instruments measured pollution concentrations approximately every 1-10 seconds. Pollutants were measured on a variety of London roads (see **Table 2**). Mobile monitoring is unique because measurements occur so close to the vehicle sources that emissions can be practically measured directly. This enables characterisation of vehicle emissions performance as well as ambient pollution on streets.

The National Physical Laboratory (NPL) conducted the necessary regular checks of instrument performance and periodic calibrations. Frequent calibrations and daily instrument and data checks were necessary to ensure the highest possible valid data capture. The *Google Street View Cars Instrumentation Operating Procedure* document provides further details about the instrumentation, checks and calibrations conducted during the project (see Appendix 3). The cars collected data from early morning to late evening, Monday to Saturday, with most of the driving occurring on weekdays.

TABLE 2. Pollutants measured by the Google Street View cars and instruments

Pollutant	Instrument
Black carbon (BC)	Magee AE33 Black Carbon Monitor
Carbon dioxide (CO_2)	LiCor Model 7200RS CO_2/H_2O Monitor
Lung Deposited Surface Area (LDSA)	Naneos Partector - nano PM monitor
Nitric oxide (NO)	Serinus 40 NO_x Monitor
Nitrogen dioxide (NO_2)	Aerodyne CAPS Direct NO_2 Monitor
Ozone (O_3)	2B Tech 211G Ozone Monitor
Particulate matter (primarily $PM_{2.5}$)	FIDAS 100 PM Monitor and Thermo PDR - 1500 $PM_{2.5}$ Nephelometer