



AQMesh

Hyperlocal small sensor air quality monitoring system



REDUCE YOUR ENVIRONMENTAL IMPACT

“ New ‘hyperlocal’ [AQMesh] sensor network will monitor London’s air quality.

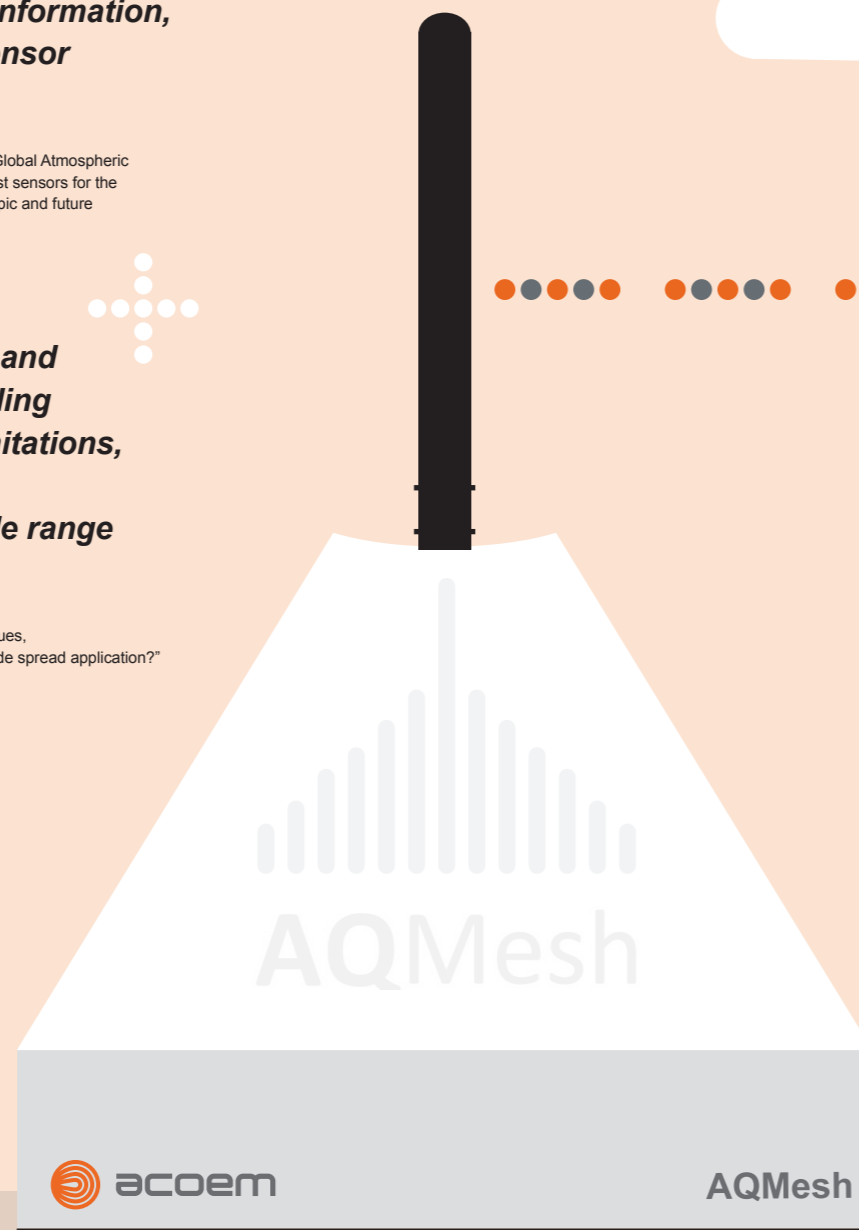
Intelligent Transport 2018, 22 Jun

“ [Small] sensors are not currently a direct substitute for reference instruments, especially for mandatory purposes; they are however a complementary source of information, provided an appropriate sensor is used.

World Meteorological Organization (WMO), International Global Atmospheric Chemistry (IGAC) & UN Environment, 2018 May, “Low-cost sensors for the measurement of atmospheric composition: Overview of topic and future applications”

“ When tested appropriately and used with a full understanding of their capabilities and limitations, [small] sensors can be an unprecedented aid in a wide range of air quality applications.

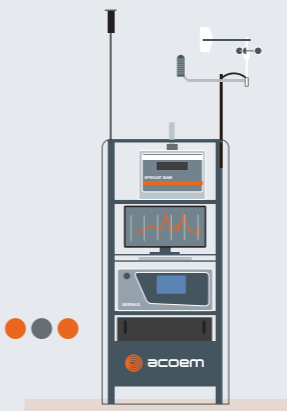
Jayaratne et al. 2018, Atmospheric Measurement Techniques, “Low-cost PM_{2.5} sensors: Is the technology matured for wide spread application?”



AQMesh + ACOEM

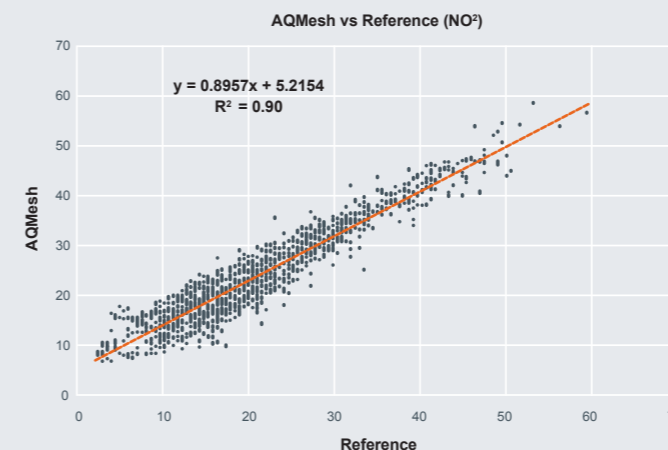
The world’s finest reference quality gas analysers have teamed up with the best of breed small sensor air quality monitoring system.

Combining AQMesh with ACOEM Ecotech’s superior range of gas analysers will transform the way smart cities and progressive thinking organisations use the power of collective environmental monitoring to measure, report and adhere to air quality standards and regulations.



“ Co-location comparison trials against certified reference equipment continue to prove AQMesh performance and reliability for localised air quality monitoring.

Environmental Technology 2018, “Latest AQMesh co-location studies show capability of small sensor systems”, 14 Nov.



AQMesh

The tried and tested name in small sensor technology for commercial use:

- 98 published scientific and research papers*
- Thousands of hours of real-world trials and commercial placements in more than 30 countries
- No other commercially available small sensor system demonstrates better accuracy.**

ACOEM

Tier one trusted global supplier of reference quality Air Quality Monitoring Systems (AQMS):

- Superior design, manufacture, installation and maintenance
- Air quality monitoring pioneer with 40 years experience
- Serinus® gas analysers for reference quality monitoring of O₃, CO, NO, NO₂, NO_x, NH₃, SO₂, H₂S, TS and TRS
- Hundreds of AQMS sites around the world consisting of thousands of individual pieces of reference quality monitoring equipment.

AQMesh + ACOEM ECOTECH GAS ANALYSERS

Designed to work alone, together with Serinus® gas analysers or in harmony with new or existing reference quality AQMS:

- Practical, cost-effective, commercial indoor and outdoor use
- Greatly increases the spatial resolution of air quality monitoring networks
- Provides hyperlocal measurement and trend analysis over time of human exposure to air pollution.

ACOEM Ecotech is the exclusive distributor of AQMesh in Australia and India.

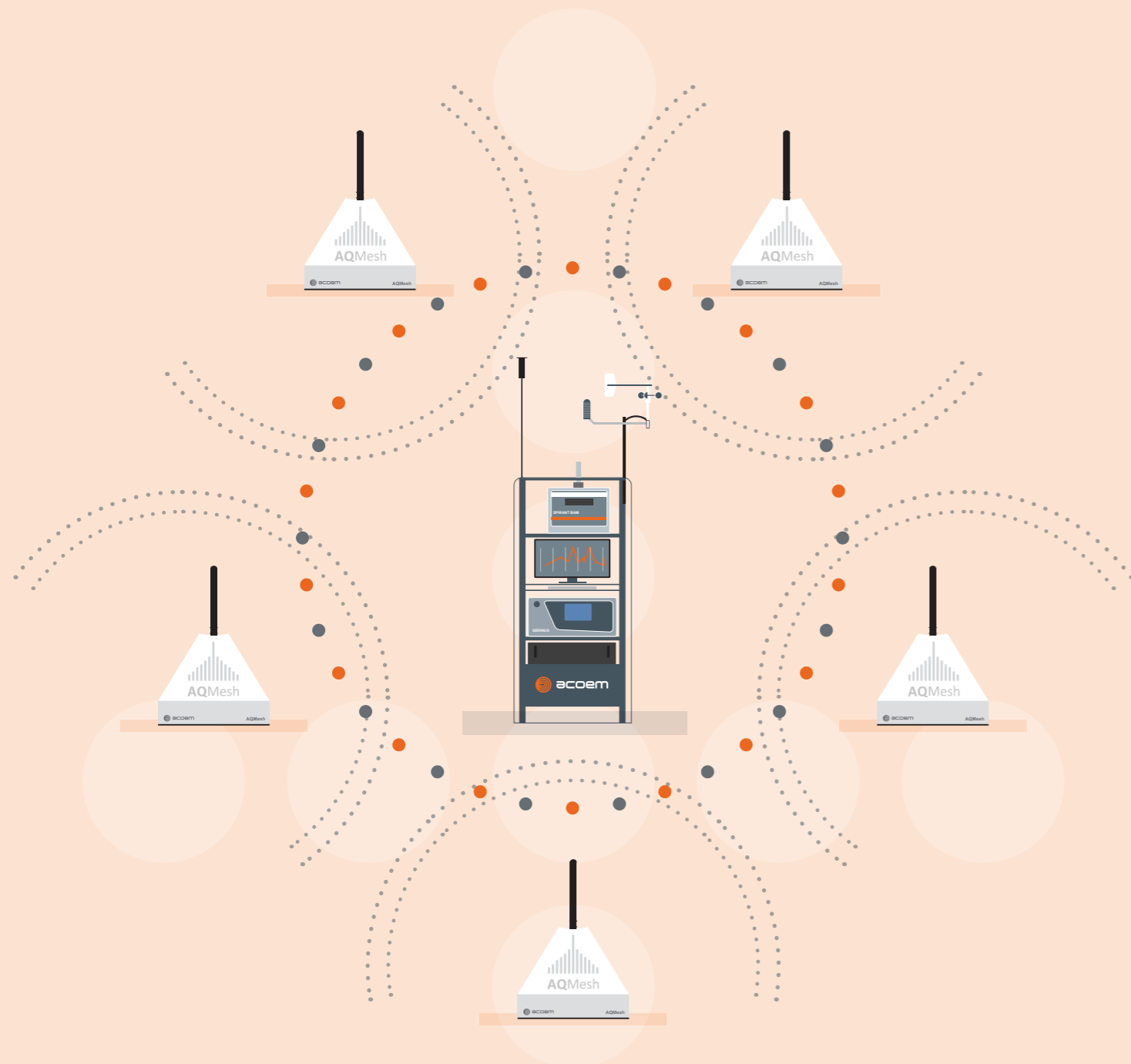
* Google Scholar as of 19 Feb 2019

** Environmental Instruments Ltd 2016, “Looking for a ‘low cost’ air quality monitoring solution?” “10 reasons why you should choose AQMesh”, 25 Jul

Scalability

When multiple AQMesh pods are added together they deliver localised real-time air quality data that supports initiatives to reduce air pollution and its risk to human health.

It's this ability to easily add, subtract, or relocate individual AQMesh pods where and when required that provides environmental professionals with a level of monitoring flexibility and scalability not possible with fixed-site reference quality AQMS alone.



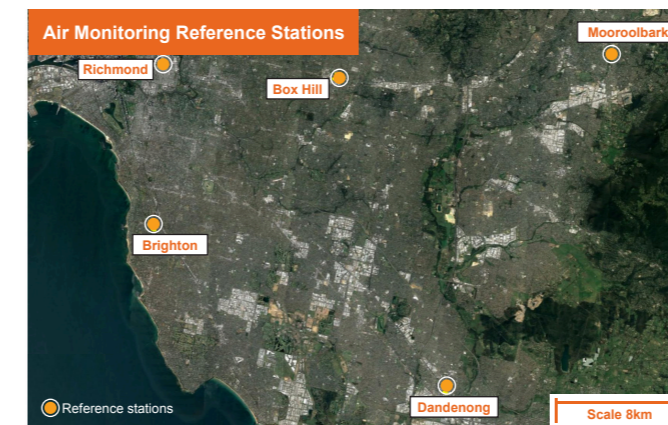
One to Many

Strategically placing a high number of AQMesh pods around and between a low number of reference quality AQMS stations delivers hyperlocal monitoring results.

However, small sensor technology is not a direct substitute for reference quality instruments, especially for mandatory or regulatory purposes.

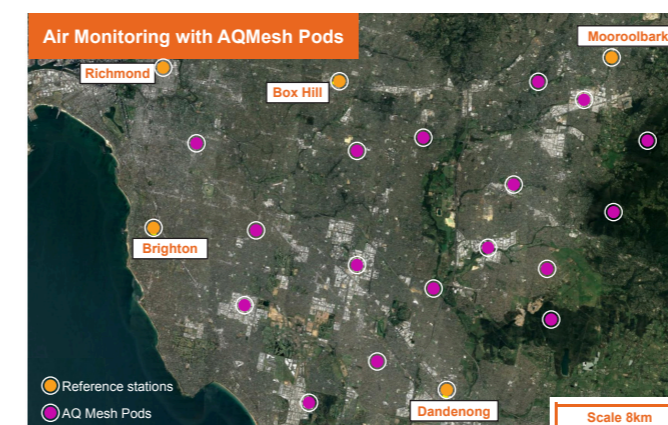
That is why when AQMesh is used as a complementary source of information to augment and enhance existing reference quality AQMS networks, environmental professionals are rewarded with increased spatial resolution of air quality data.

Increased spatial resolution of air quality data dramatically multiplies the opportunity for better understanding, insight and action.



MELBOURNE SOUTH EASTERN SUBURBS

- A city of 5 million
- 5 ACOEM Ecotech reference quality AQMS stations
- 10-20 km apart
- Mixed land use over changing topography: Suburban, residential, commercial, industrial, roads, parks



WHAT AN AUGMENTED AIR MONITORING NETWORK COULD LOOK LIKE

- Add 25 AQMesh pods
- Each pod 3-7 km apart
- 5 AQMS + 25 AQMesh = Significantly increase understanding of air quality at the neighbourhood level
- Target identified pollution hotspots

AQMesh

The proven small sensor air quality monitoring system

AQMesh has been designed to offer a robust and easy-to-use air quality monitoring system that can deliver localised real-time readings, improving the accuracy and scope of gathering air quality data to support initiatives to reduce air pollution and its risk to human health.



Power

Option	Expected life span*	Notes
External DC	> 5 years	9 – 24V DC
Lithium metal battery pack #10	> 24 months	Dependent on measurement strategy & pod spec
External high capacity battery pack #10	> 60 months	Dependent on measurement strategy & pod spec
NIMH rechargeable battery pack	> 4 months	Dependent on measurement strategy & pod spec
Solar power pack	> 5 years	Change internal lead-acid battery every 24 months

Sensor life

Sensor type	Expected life span
Electrochemical	2 years #6
NDIR	5 years
Solid state	5 years
Omnidirectional microphone	5 years
Optical particle counter	2 years #6

Physical

ENCLOSURE
ABS, protection IP65
ENVIRONMENTAL
Temperature range: - 20 to + 40 °C
Humidity range: 15 to 95 % RH
MOUNTING
Pod supplied with mounting bracket for walls / posts
APPROX. SIZE & WEIGHT
Length: 170 mm
Width: 220 mm
Height (excl antenna): 250 mm
Height (incl antenna): 430 mm
Weight: 2 – 2.7 kg

Data & Communications

COMMUNICATIONS
Data sent to remote server via 2G or 3G SIM (data access contract is required)
MEASUREMENT PERIOD
Variable, from 1 min to 1 hr
TRANSMISSION FREQUENCY
Variable, from 5 mins to 12 hr intervals
SERVER SOFTWARE
Web browser based, processing of sensor output to give reading, database storage on secure server
DATA ACCESS
Tables, graphs, data download, multi-user access, password controlled, optional API data access

AQMesh SPECIFICATIONS†

Measurement

Sensor	Sensor Type	Units	Range #1
NO	Electrochemical	ppb or µg/m³	0 to 20,000 ppb
NO ₂	Electrochemical	ppb or µg/m³	0 to 20,000 ppb
NO _x	Electrochemical	ppb or µg/m³	0 to 40,000 ppb
O ₃	Electrochemical	ppb or µg/m³	0 to 20,000 ppb
CO	Electrochemical	ppb or µg/m³	0 to 1,000,000 ppb
SO ²	Electrochemical	ppb or µg/m³	0 to 100,000 ppb
H ₂ S	Electrochemical	ppb or µg/m³	0 to 100,000 ppb
CO ₂	NDIR	ppm or mg/m³	0 to 5,000 ppm
Pod temperature	Solid state	°C or °F	-20 °C to 100 °C
Pressure	Solid state	mb	500 to 1500 mb
Humidity	Solid state	%	0 to 100 %
Noise#6	Omnidirectional mic	dB	35 to 100 dB SPL
Particle count	Optical particle counter	Particles/cm³	0.30 to 30 µm
PM ₁ #5	Optical particle counter	µg/m³	0 to 100,000 µg/m³
PM _{2.5} #5	Optical particle counter	µg/m³	0 to 150,000 µg/m³
PM ₄ #5	Optical particle counter	µg/m³	0 to 225,000 µg/m³
PM ₁₀ #5	Optical particle counter	µg/m³	0 to 250,000 µg/m³
PM _{Total} #5	Optical particle counter	µg/m³	0 to 350,000 µg/m3
Lat, long, alt	GPS	decimal	N/A

Performance

Sensor	Limit of confidence #2	Precision #3	Accuracy #4
NO	< 5 ppb	> 0.9 R²	1 ppb
NO ₂	< 5 ppb	> 0.85 R²	4 ppb
NO _x	< 10 ppb	> 0.9 R²	4 ppb
O3	< 5 ppb	> 0.9 R²	5 ppb
CO	< 50 ppb	> 0.9 R²	20 ppb
SO ₂	< 10 ppb	> 0.7 R²	20 ppb
H ₂ S	< 5 ppb	> 0.7 R²	1 ppb
CO2	< 1 ppm	> 0.9 R²	30 ppm

Sensor	Limit of detection	Precision #3	Accuracy #4
Pod temperature	0.1 °C	> 0.9 R²	± 2 °C
Pressure	1 mb	> 0.9 R²	± 5 mb
Humidity	1 % RH	> 0.9 R²	± 5 % RH
Noise#6	20 Hz to 20 kHz	> 0.8 R²	1 dB
PM ₁ #5	0 µg/m³	> 0.9 R²	5 µg/m³
PM _{2.5} #5	0 µg/m³	> 0.9 R²	5 µg/m³
PM ₄ #5	0 µg/m³	> 0.9 R²	5 µg/m³
PM ₁₀ #5	0 µg/m³	> 0.85 R²	5 µg/m³
PM _{Total} #5	0 µg/m³	> 0.85 R²	5 µg/m³

Product designs and specifications are subject to change without prior notice.

The user is responsible for determining the suitability of the product.

*h denotes when used with optional heated inlet for PM monitoring

#1 From sensor manufacturer’s specification. This data was derived from independent lab tests. Standard test conditions are 20°C and 80% RH and in the absence of interfering gases. Tested range is -30°C to +30°C.

#2 Readings provided below this level, however due to interferences the level of uncertainty is greater than at higher levels of the target pollutant.

#3 Correlation co-efficient derived from extensive global co-location comparison testing against certified reference.

#4 Best ‘out of the box’ accuracy without any local scaling/calibration against reference.

#5 Mass estimation based on standardisation of particle shape and density. Range is based on optical range of 0.3-30mm particle size.

#6 Noise measures average noise and peak noise. Peak noise is the highest recorded value over the gas reporting interval while average noise is calculated using all noise samples over the same period.

#7 Wind speed and direction stated accuracy is at 12ms-2

#8 Electrochemical sensors and particle sensors carry a 12-month warranty.

#9 Detail of maintenance required is listed in the standard operating procedure.

#10 Subject to carrier restrictions on dangerous goods

† Gas algorithm v5.0
PM algorithm v3.0 (and v3.0h)



ABOUT ACOEM: Reduce your environmental impact

The ACOEM Group is a global leader in providing sustainable solutions for the development of smart cities of the future. It is committed to helping companies and public authorities meet challenges by offering products and services that:

- Prevent and control air, noise and vibration pollution
- Increase the productivity and reliability of industrial machinery
- Contribute to the development of effective, robust & noiseless solutions
- Protect soldiers, sites and vehicles in military theatres of operation.

Across the world, ACOEM's 700+ employees innovate in the measurement, analysis and control of environmental parameters through its 01dB, ECOTECH, DYNOPTIC, TUNNEL SENSORS, AIR MONITORS, ONEPROD, FIXTURLASER, MEAX, VIBRALIGN and METRAVIB brands.

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