



Tracking Air Quality for Healthy and Liveable Cities

Liveable Cities Lab on “Tech and the City”
December 12, 2024 [2:00 to 4:30 PM via Zoom]

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***Regional Account Manager –
Southeast Asia and Oceania***

www.clarity.io



Agenda

1. Introduction
2. Air Pollution and its Health Impact
3. Clarity Movement – Who We are and What We Do
4. Our Technology and Approach to Air Monitoring
5. Our Impact – Partnerships & Success Stories
6. Challenges and Learnings
7. A Case in Progress for Metro Manila
8. Closing Thoughts

The INVISIBLE KILLER

8.1 Million
deaths
worldwide
in 2021

58% of deaths
due to
Ambient
PM2.5



700k
deaths are
children
under 5

99% of world's urban
population
breathe
polluted air

11 SUSTAINABLE CITIES
AND COMMUNITIES



MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE,
SAFE, RESILIENT AND SUSTAINABLE

The Ticking Time Bomb: Air Pollution in the Philippines



>60K deaths

Air pollution is linked to >60K premature deaths annually in Metro Manila



P4.5 Trillion

Annual economic cost of air pollution in the Philippines (2019)



30% Deaths

30% of deaths due to air pollution are children under 5yo in PH

10 Years of Clarity Movement



We are on a **mission** to empower the world to **reduce air pollution**

85+

**countries
with sensors**

250+

**cities
using Clarity**

10K+

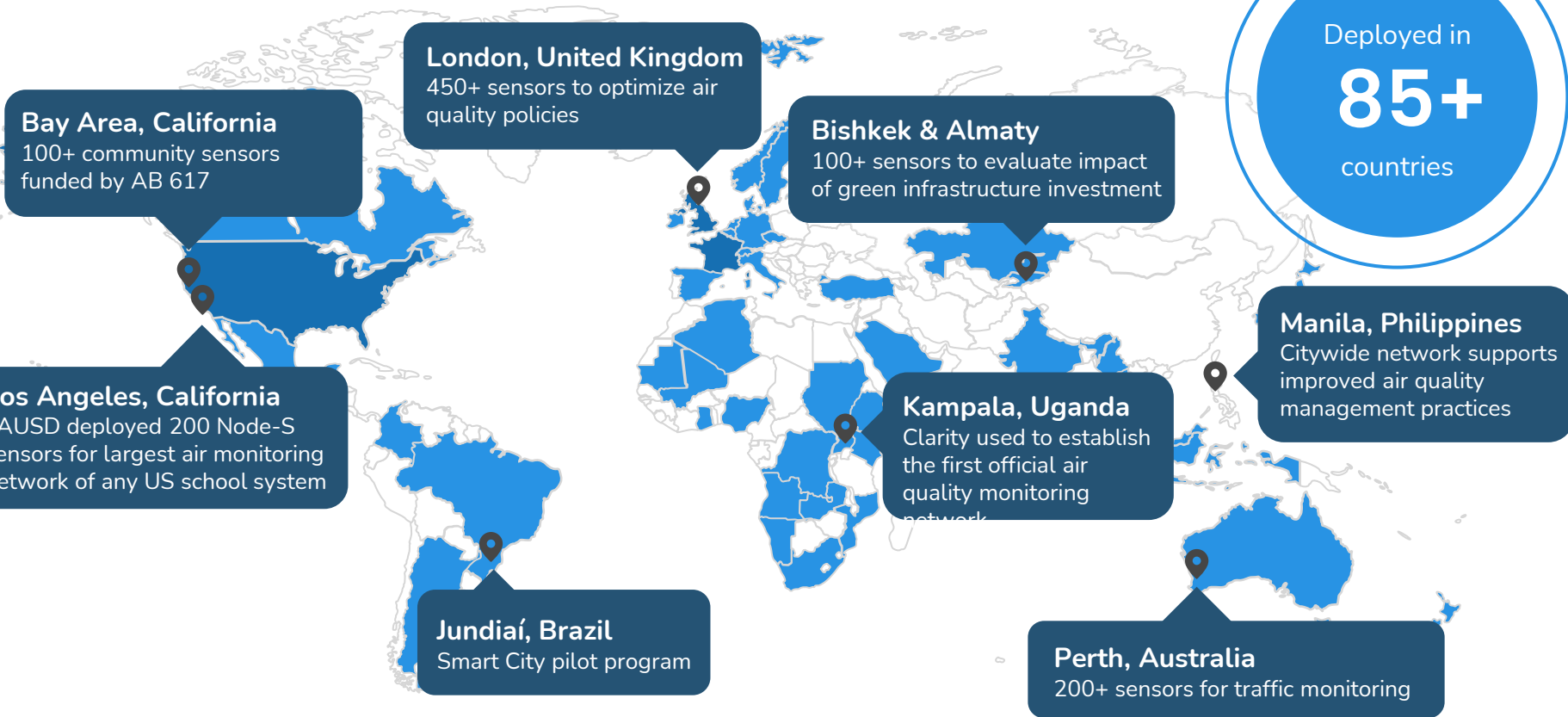
**unique
deployments**

500M+

**air quality
measurements**

A globally adopted solution

Deployed in
85+
countries



Bay Area, California
100+ community sensors funded by AB 617

London, United Kingdom
450+ sensors to optimize air quality policies

Bishkek & Almaty
100+ sensors to evaluate impact of green infrastructure investment

Los Angeles, California
LAUSD deployed 200 Node-S sensors for largest air monitoring network of any US school system

Jundiaí, Brazil
Smart City pilot program

Kampala, Uganda
Clarity used to establish the first official air quality monitoring network

Manila, Philippines
Citywide network supports improved air quality management practices

Perth, Australia
200+ sensors for traffic monitoring

Providing a fully integrated air quality monitoring solution

Sensing-as-a-ServiceSM



Clarity Node Platform

Measures all key air pollutants

- Solar-powered
- Cellular-connected
- Easily installed within 5 minutes



Clarity Cloud

Cloud-based data analysis

- Natively-integrated IoT dashboard
- Secure data pipeline & storage
- Powerful APIs, analytics and visualization



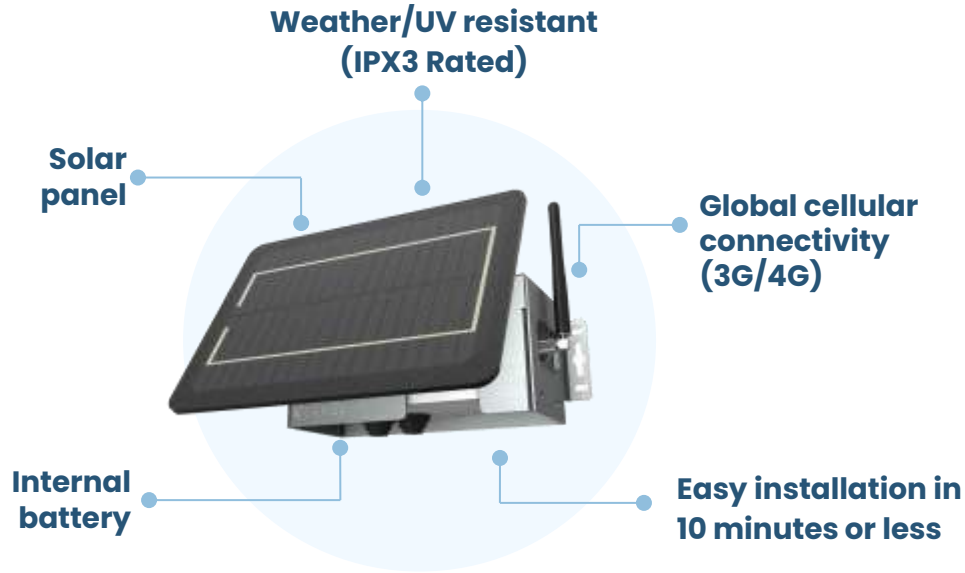
Clarity Expert Support

Scalable project support

- Highly qualified air quality experts
- Accurate and reliable data through Remote Calibration
- Responsive project management enabled by modern software stack

Clarity Node-S

A resilient, independently powered, and cellular-connected air monitor



Measures **PM** and **NO2**.

MCERTS, FCC & CE certified and designed for **easy deployment** everywhere, and **reliable operation** in adverse weather conditions.



Decoding Air Quality Index: A Guide to Air Quality and Health

Ano ang Air Quality Index?

Ang AQI ay ginagamit upang malaman ang air quality at mga paalala upang maiwasan ang masamang epekto dulot nito sa kalusugan ng tao.



Good

- Walang babala



Fair

- Walang babala



Unhealthy for Sensitive Groups

- Iwasang lumabas kung mayroong respiratory disease tulad ng hika.



Very Unhealthy

- Iwasang lumabas ng bahay at limitahang gumamit ng sasakyan
- Iwasan ang lugar na may matinding traffic
- Manatili at magpahinga sa bahay kung may heart/respiratory disease



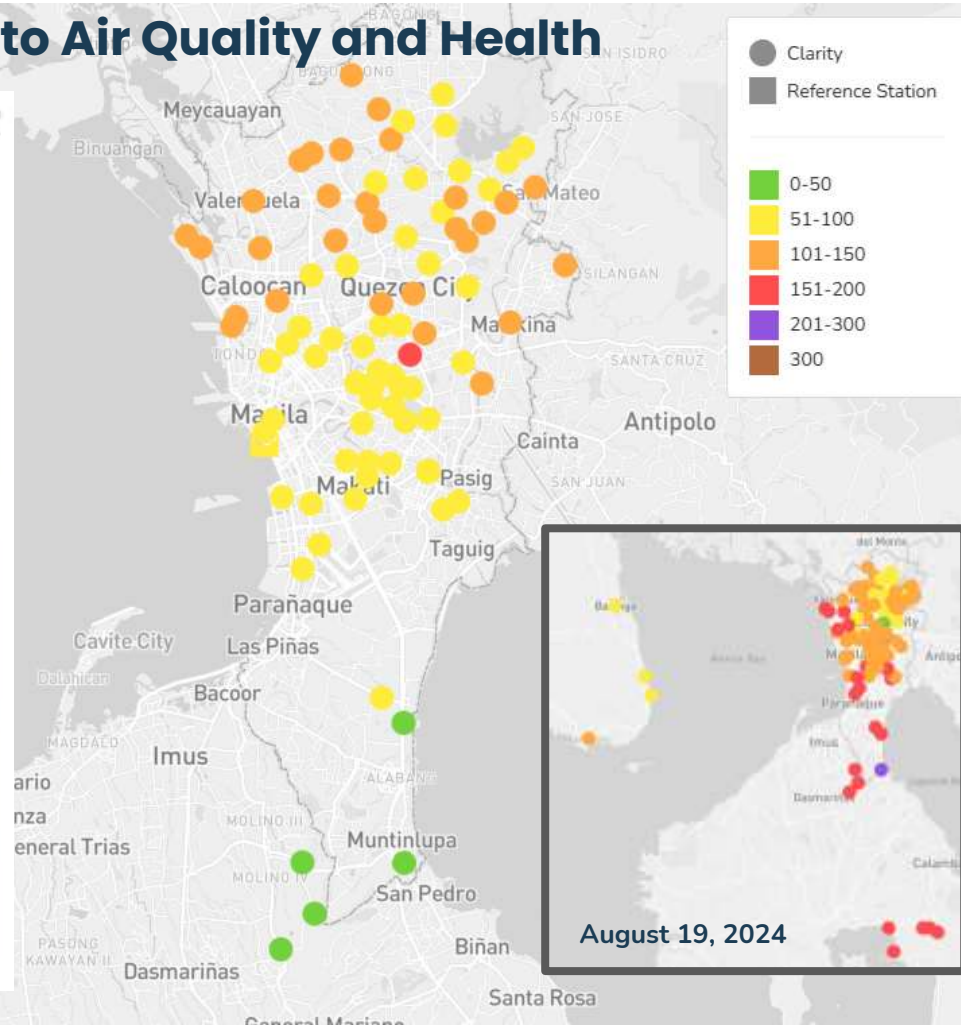
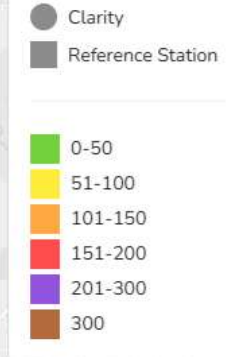
Acutely Unhealthy

- Iwasang lumabas ng bahay. Manatili at magpahinga kung may heart/respiratory disease
- Maaaring limitahan ang paggamit ng sasakyan at bawasan ang mga gawaing pang-industriya.



Emergency

- Ang lahat ay dapat manatili sa loob ng bahay
- Ipinagbabawal ang pagtayahe ng sasakyan maliban kung medical o emergency ang dahilan
- Kailangang bawasan ang mga gawaing pang-industriya maliban kung makakaapekto sa kalusugan at kaligtasan



Credits: AQI Infographics from Quezon City Government

Decoding Air Quality Index: A Guide to Air Quality and Health


LAUSD Know Your Air

PM2.5 US EPA AQI
Good → Hazardous




Search place

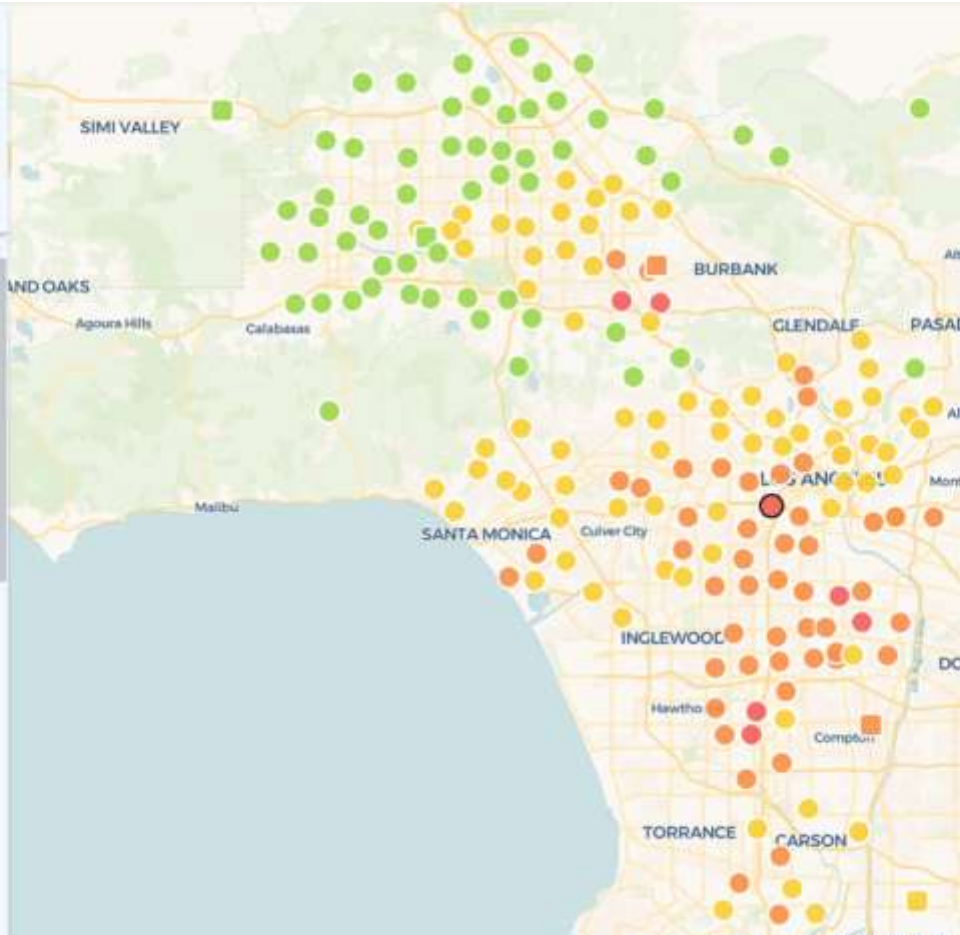
Norwood ES (5699)

Current Air Quality

 **PM2.5 AQI** 152
PM2.5 $\mu\text{g}/\text{m}^3$ 57.6
Unhealthy Measured 56 minutes ago

Health Recommendations

-  Everyone should limit outdoor activities; sensitive groups should stay indoors.
-  Close windows and doors to keep indoor air clean.
-  Run an air purifier if available.



Trend

▼ 1% better than previous hour

The bar chart shows the PM2.5 AQI over a 72-hour period. The y-axis ranges from 0 to 200. The x-axis shows time in 3-hour intervals: Dec 04 (09:00, 15:00, 21:00), Dec 05 (09:00, 15:00, 21:00), and Dec 06 (09:00, 15:00). The AQI values fluctuate between approximately 50 and 150, with a notable peak of about 150 on Dec 06 at 21:00.

Monitoring Device

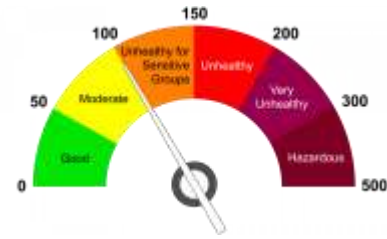
 Clarity Node-S - [learn more](#)

Location

Norwood Street Elementary School, West 20th Street, Saint James Park, Pico-Union, Los Angeles, California, 90007, United States

Powered by **ORANGE clarity**

Lahore's air quality spikes to 1,067 under 'dangerous' category, new record high



Lahore, Pakistan's second-largest city, is grappling with unprecedented air pollution levels. Authorities implement emergency measures as residents face heightened health risks.



Our Impact – Partnerships and Success Stories

Quezon City, Philippines

Number of Clarity Nodes:

8 → 40
June 2021 → Dec 2023

“We are advancing steadily to the attainment of cleaner air for our citizens as promised. Having real-time air quality data across the city can lead to more specific air quality management actions and decisions – identifying sources and locations we need to focus on while providing guidance on health exposure of our citizens through the air quality index.”

JOSEFINA BELMONTE
Mayor, Quezon City

Action Enabled:
Improve air quality with targeted policies



QUEZON CITY Air Quality Monitoring Network

Air Quality (AQ) Equipment



Non-reference AQ Sensors

- Parameters: Particulate Matter (PM_{2.5})



Reference Station

- Parameters: Particulate Matter (PM_{2.5}), NO_x, SO₂

Sites Category

- Church, Hospital, School
- Commercial
- Commercial, Residential
- Green, Public Space
- Industrial
- Residential
- Roadside

QC AQM Sensor Placement

- Non-Roadside
- Roadside
- Reference Station



www.fb.com/qc.climatechangedepartment



ClimateChange@quezoncity.gov.ph



8988-6245 local 8359

#CleanAirForQC

Community Engagement and Public Awareness



Paano nasusukat ang level ng polusyon sa hangin?

#QuezonCity | CleanAirAsia | DENR | 02-833-1111 | @denrphilippines

Paano nasusukat ang level ng



Ginagamit ang air quality monitor upang masukat ang level ng pollutant sa hangin.

#QuezonCity | CleanAirAsia | DENR | 02-833-1111 | @denrphilippines

Ano ang "Air Pollution"

Ang mga sakit na maaaring makuha o mas mapalala dahil sa mababang kalidad ng hangin ay:



Sakit sa baga: (Lung Cancer, Chronic Obstructive Pulmonary Disease, hika)



Sakit sa puso: (Ischemic Heart Disease)



Type II diabetes



Developmental delays ng mga bata



Mababang timbang ng sanggol, preterm birth

#QuezonCity | CleanAirAsia | DENR | 02-833-1111 | @denrphilippines

Ano ang "Air Pollution"



- Matatanda at bata ang pinaka apektado ng polusyon sa hangin na sanhi ng 20% pagkamatay ng mga sanggol sa buong mundo.



- Ang air pollution ay maaaring "outdoor" o "indoor" depende sa source o exposure ng mga tao.

#QuezonCity | CleanAirAsia | DENR | 02-833-1111 | @denrphilippines

Community Engagement and Public Awareness



Air Quality in Quezon City

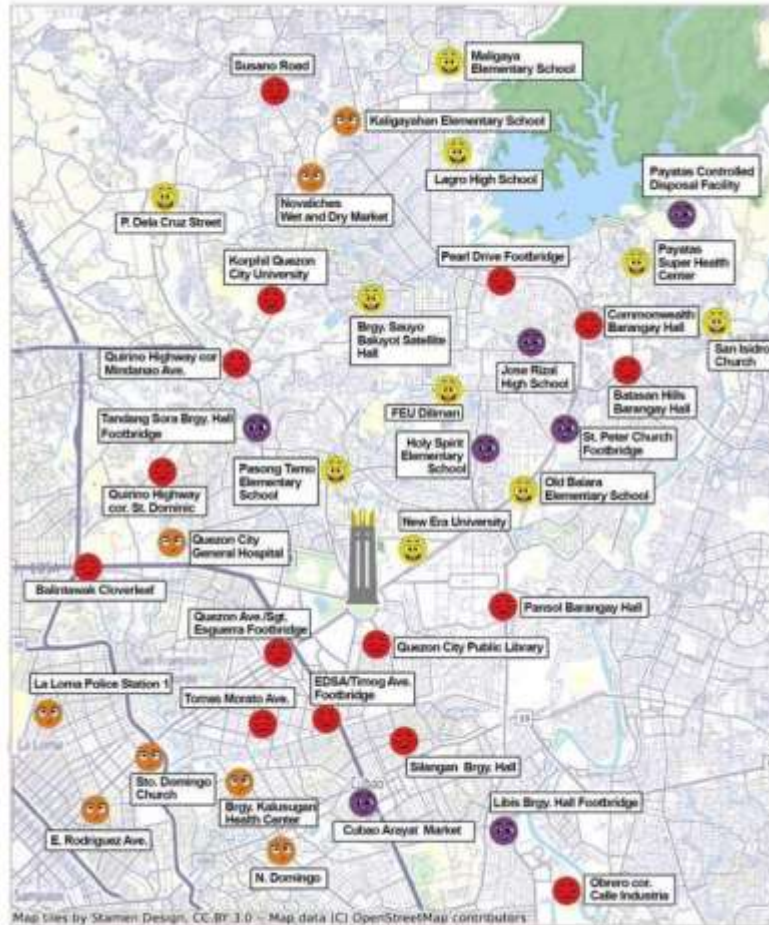
24 Hour PM_{2.5} AQI

12NN October 09 to 12NN October 10, 2024

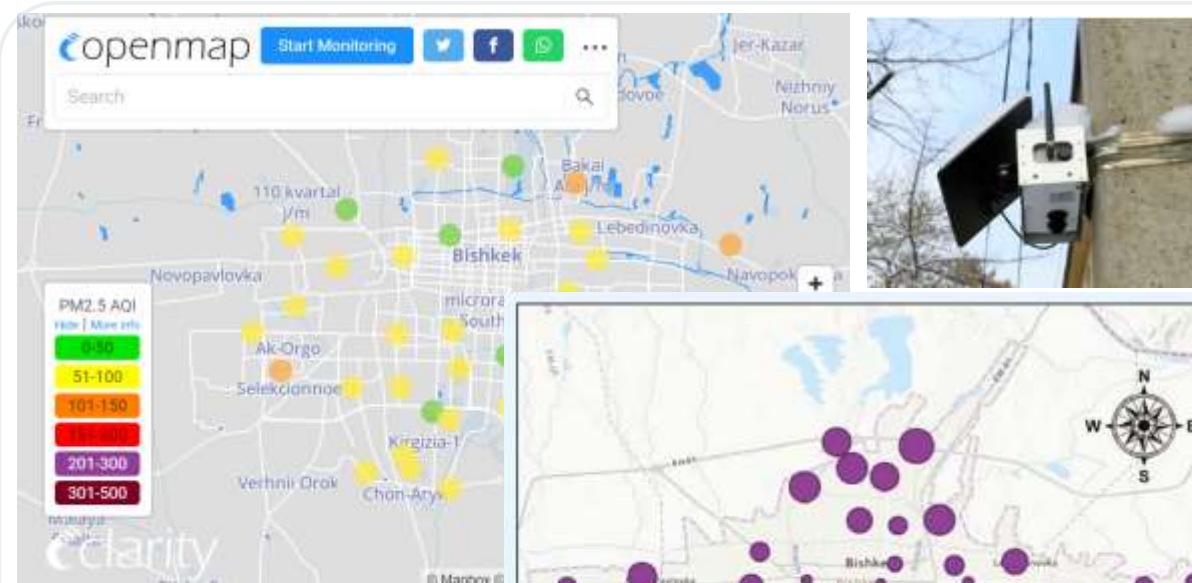
Air Quality Index (AQI)

Ang AQI ay ginagamit upang malaman ang air quality at mga paalala upang malwasan ang masamang epekto na dulot nito sa kalusugan ng tao.

	Good (0 - 25 ug/m ³)	- Walang babala.
	Fair (25.1 - 35.0 ug/m ³)	- Walang babala.
	Unhealthy for Sensitive Groups (35.1 - 45.0 ug/m ³)	- Iwasang lumabas kung mayroong respiratory disease tulad ng hika.
	Very Unhealthy (45.1 - 55 ug/m ³)	- Iwasang lumabas ng bahay at limitahang gumamit ng sasakyan. - Iwasan ang lugar na may matinding traffic. - Manatili at magpahinga sa bahay kung may heart/respiratory disease.
	Acutely Unhealthy (55.1 - 90 ug/m ³)	- Iwasang lumabas ng bahay. Manatili at magpahinga kung may heart/respiratory disease. - Maaring limitahan ang paggamit ng sasakyan at bawalan ang mga gawing pang-industriya.
	Emergency (Above 91 ug/m ³)	- Ang lahat ay dapat manatili sa loob ng bahay. - Ipinagbabawal ang pag-iyak ng sasakyan maliban kung medical o emergency ang dahilan. - Kailangang bawalan ang mga gawing pang-industriya maliban kung makakaapekto sa kalusugan at kaligtasan.

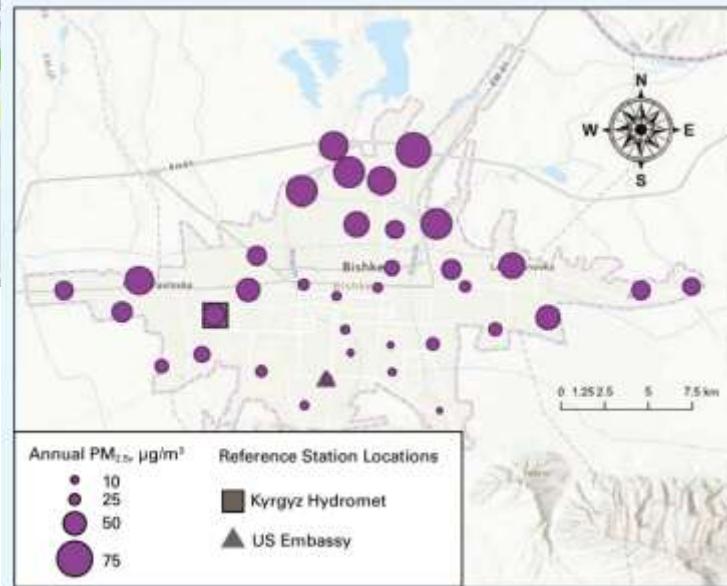


Our Impact – Partnerships and Success Stories



40.3%

Of domestic energy production is coal- fuelled nationally and 57% of the population of Bishkek heat their homes with coal.



Bishkek, Kyrgyzstan

Number of Clarity Nodes: **50**

“In 2020, we installed 50 sensors in the city of Bishkek. We placed some of them near roads, some in residential areas, and some in social facilities. Thanks to the Global SIM Card which is incorporated in the sensors, we get the data directly to our system which allows us to visualize the data. The data is ready for analysis.”

BEGAIM ALIPOVA
Kyrgyz Hydromet

Action Enabled:
Improve air quality with targeted policies

Establishing a data-driven clean air initiative



Bishkek Clean Air Action Plan

April 2023

TA-9919 REG:
Integrated and
Innovative Solutions
for More Livable Cities
Sub-Project 1



Impacts on City Livability

Public Health and Climate Change

The most glaring impact of Bishkek's poor air quality on the city's livability is the reduced access of its resident to a healthy urban environment. Long-term exposure to high concentrations of particulate matter puts residents' health and safety at risk.



Public Health

The most vulnerable groups are young children who are still going through lung development, individuals with pre-existing health conditions, and the elderly.

The two most problematic pollutants in Bishkek are $PM_{2.5}$ and NO_2 . Direct health impacts from $PM_{2.5}$ exposure include premature death, acute upper respiratory infections, and non-fatal heart attacks. NO_2 adverse health outcomes include respiratory disease and asthma.



Climate Change

GHG emissions from fossil fuel combustion negatively impact climate change.

Particulate matter components can have warming or cooling effects on the climate.

Ozone in the atmosphere warms the climate. Ozone is not currently measured in Bishkek, and its impact is neglected.

HEALTH AND SOCIAL IMPACTS OF AIR POLLUTION ON WOMEN AND CHILDREN IN BISHKEK, KYRGYZSTAN

ENTRY-POINTS FOR ACTION



unicef
for every child

Challenges in Scaling Air Quality Monitoring



Scaling Up



Data Reliability



Data Sharing

Opportunities for Growth and Impact



Collaborations
& Partnerships



Community
Engagement



Behavioral
Change



Innovation

Lessons Learned: Success Factors in AQM

01

Know your objectives

02

Select the right air monitoring solutions

03

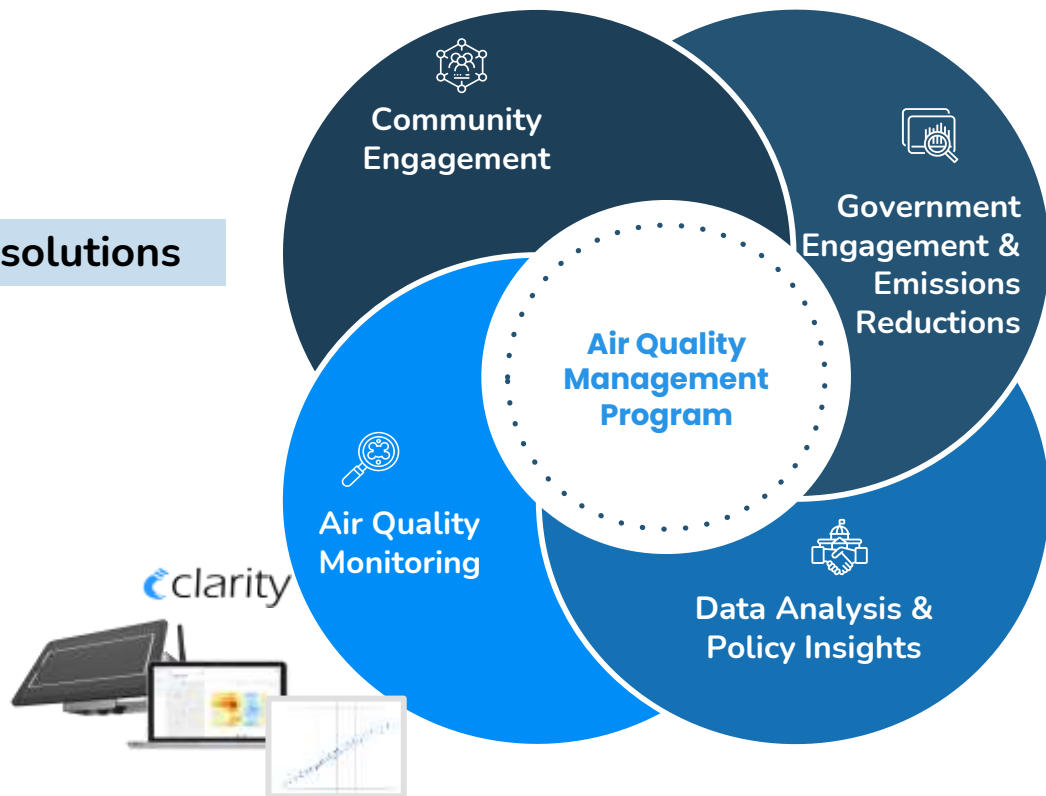
Analyze the data

04

Engage with community

05

Engage with regulators



From Data to Impact: A Case in Progress for Metro Manila

Scaling Up through Public & Private Sector

Driving Change through Data

Empowering the Stakeholders: LGUs, Businesses, General Public

From Data to Action: leveraging the use of data for policies and efficient use of resources



A globally proven air quality monitoring solution

The Clarity Node-5 is an IoT-based air quality monitoring technology that transforms how governments, communities, and businesses understand and respond to air pollution. Clarity's particulate matter (PM) and nitrogen dioxide (NO2) monitor is self-powered, FCC/CE certified, MCERTS-certified, UV-resistant, and weatherproof. Used in more than 70 countries — including Breathe London, the world's largest air sensor network — Clarity's air quality measurement solutions provide affordable, continuous monitoring and accurate, calibrated air pollution data for cities globally. [Learn more at www.clarity.io](http://www.clarity.io)

Become a Founding Partner: Elevate Your Brand's Corporate Social Responsibility with Breathe Metro Manila

Founding partners of Breathe Metro Manila can elevate their brand's corporate social responsibility profile. This partnership offers unparalleled brand visibility and recognition opportunities across the Manila metropolitan region.

From prominent acknowledgment on our website to unique branding opportunities on our Air Quality Map, your company will be at the forefront of a transformative initiative. Align your brand with a cause that generates significant goodwill and demonstrates your commitment to a healthier, more sustainable future for Manila.

“ We are advancing steadily to the attainment of cleaner air for our citizens as promised. Having real-time air quality data across the city can lead to more specific air quality management actions and decisions — identifying sources and locations we need to focus on while providing guidance on health exposure of our citizens through the air quality index.”

— Joy Belmonte, Mayor of Quezon City ”

Get involved — donate today!

Breathe Metro Manila founding partner benefits:

- Access to the Breathe Metro Manila Dashboard to view real-time air quality data and insights.
- Recognition as a founding partner on the Breathe Metro Manila website.
- Branding opportunities on the Breathe Metro Manila Air Quality Map.

Every donation of PHP 1.5M funds 10 monitoring sites!

Breathe Metro Manila



Be Part of the Change: Join us in Building Healthier Communities

We're here to answer any questions!

hello@clarity.io

ethel@clarity.io

Learn more on the Clarity website

clarity.io