

WHAT IS THE AIR SENSOR NETWORK?

The Chicago Air Sensor Network is a citywide project consisting of 277 air sensors that were installed in Summer 2025. The Chicago Air Sensor Network will collect data on fine particulate matter (PM_{2.5}) and nitrogen dioxide (NO₂), providing hyperlocal air quality information for Chicago communities and residents on a public-facing dashboard.

Air quality data across the City of Chicago have historically come from disparate sources with limited spatial coverage (e.g., data collected at EPA air monitoring stations using Federal Reference Monitors (FRMs) and Federal Equivalent Monitors (FEMs) and data collected using low-cost sensors like PurpleAir and AirBeam).

The Chicago Air Sensor Network provides the opportunity for community organizations, academic researchers, and City agencies to come together for a more comprehensive approach utilizing high-resolution air quality data collection to respond to community needs at the community level.



WHO ARE THE PARTNERS IN THE AIR SENSOR NETWORK?

LEAD AGENCIES:

- Chicago Department of Public (CDPH)
- University of Illinois School of Public Health (UIC SPH, PI: Dr. Serap Erdal)

ADVISORY BOARD:

- Alliance of the Southeast
- Chicago Environmental Justice Network
- Communities United
- Grow Greater Englewood
- Little Village Environmental Justice Organization
- Neighbors for Environmental Justice
- ONE Northside
- Openlands
- People for Community Recovery
- Pilsen Environmental Rights and Reform Organization
- Southeast Environmental Task Force
- The Southwest Collective
- Westside Cultural Alliance
- Chicago Department of Transportation
- Cook County Dept of Environment and Sustainability
- Illinois Environmental Protection Agency

ADDITIONAL PARTNERS:

- Illinois Public Health Institute
- RHP Risk Management
- University of Illinois Urbana-Champaign
- Clarity Movement Company
- ComEd Exelon

HOW DID THE NETWORK GET STARTED?

13
community
partners

13 community based organizations, and cross-jurisdictional agency partners, served as an Advisory Board to help CDPH and UIC SPH launch the Network.

NETWORK PARTNERS CAME TOGETHER TO INSTALL SENSORS ACROSS THE NETWORK.

277
sensors

277 Clarity Node-S Air Sensors were installed on light poles across the City throughout Summer 2025.

SENSORS PROVIDE HYPERLOCAL COVERAGE

< 1
mile apart

Each air sensor in the Chicago Air Sensor Network is less than 1 mile apart from other sensors.



WHAT ARE EMISSION SOURCES OF AIR POLLUTION IN CHICAGO?

Major air pollution sources in Chicago include mobile sources (i.e., transportation sources such as cars, trucks, planes, and trains) and stationary sources (i.e., industrial facilities like power plants and factories).



WHAT ARE THE HEALTH EFFECTS OF NO₂ AND PM_{2.5}?

Breathing air with a high concentration of NO₂ can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO₂.

Small particles less than 10 micrometers in diameter pose the greatest health problems, because they can get deep into your lungs, and some may even get into your bloodstream. Exposure to such particles can affect both your lungs and your heart. Numerous scientific studies have linked particle pollution exposure to a variety of adverse health effects, including premature death in people with heart or lung diseases, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

WHO ARE SENSITIVE POPULATIONS?

Populations that are especially sensitive to the health effects of air pollution include children, older adults, individuals who are pregnant, and people living with asthma, COPD, or other chronic diseases. In addition, people of color, individuals with lower incomes, and those who live or work near sources of pollution or in outdoor settings often experience higher exposure to air pollution.

HOW WILL THE NETWORK MAKE A DIFFERENCE?

The Clarity Node-S Air Sensors will provide neighborhood-level air quality data to the public in a way that is useful and easy to understand so that Chicagoans can be equipped with information on how to limit or minimize their exposures to air pollution as a preventative measure for potential health impacts.

The data will also be used as part of CDPH's ongoing health surveillance activities (which can be found on the *Chicago Health Atlas*). UIC SPH will analyze the data to further community-based research and disseminate findings to both the technical, scientific, and regulatory community and the public at large.

Learn more about the Chicago Air Sensor Network at
chicago.gov/envcommunityinfo

Frequently Asked Questions (FAQs)

v1, 10/29/2025

- **What is the Chicago Air Sensor Network? What is the purpose of the network?**
 - The Chicago Air Sensor Network is a citywide project consisting of 277 air sensors that were installed in Summer 2025. The Chicago Air Sensor Network will collect data on fine particulate matter (PM_{2.5}) and nitrogen dioxide (NO₂), providing hyperlocal air quality information for Chicago communities and residents on a public-facing dashboard.
 - Air quality data across the City of Chicago have historically come from disparate sources with limited spatial coverage (e.g., data collected at EPA air monitoring stations using Federal Reference Monitors (FRMs) and Federal Equivalent Monitors (FEMs) and data collected using low-cost sensors like PurpleAir and AirBeam), leading to individual approaches of community members, academic partners, government officials, nonprofit organizations, researchers, and others for data analysis and interpretation. Community organizations, academic researchers, and the City's agencies have long recognized the need for a more comprehensive approach utilizing high-resolution air quality data collection to respond to community needs at the community level.
- **Who are the lead agencies supporting the Chicago Air Sensor Network?**
 - Chicago Department of Public (CDPH) and the University of Illinois School of Public Health (UIC SPH, PI: Dr. Serap Erdal)
- **What organizations does the Advisory Board represent?**
 - The Chicago Air Sensor Network Advisory Board includes the Alliance of the Southeast (ASE); Chicago Environmental Justice Network (CEJN); Communities United; Grow Greater Englewood; Little Village Environmental Justice Organization (LVEJO); Neighbors for Environmental Justice (N4EJ); ONE Northside; Openlands; People for Community Recovery (PCR); Pilsen Environmental Rights and Reform Organization (PERRO); Southeast Environmental Task Force (SETF); The Southwest Collective; and the Westside Cultural Alliance; Chicago Department of Transportation (CDOT); Cook County Department of Environment and

Sustainability, and Illinois Environmental Protection Agency, with convening support from the Illinois Public Health Institute (IPHI).

- **Who else is partnering with CDPH and UIC SPH on the Chicago Air Sensor Network?**

- RHP Risk Management, University of Illinois Urbana-Champaign (PI: Dr. Marynia Kolak under subcontract to UIC SPH); Clarity Movement Company; ComEd Exelon, LLC; Illinois Public Health Institute (IPHI)

- **How did the partners come together to form the Chicago Air Sensor Network?**

- In summer 2022, community and City leaders began the development of Chicago's first Cumulative Impact Assessment, a citywide project to provide data on how environmental burdens and other stressors vary in impact across the City. This work reinforced and supported the Voluntary Compliance Agreement (VCA) with the U.S. Department of Housing and Urban Development, signed in May 2023.
- In addition to the Assessment itself, a citywide Environmental Justice (EJ) Action Plan was created in partnership with more than 10 City departments and was released in September 2023. One of CDPH's EJ Action Plan strategies included the expansion of the City's community air monitoring network to increase the concentration of sensors in partnership with organizations representing EJ neighborhoods.
- In 2023, Partnership for Healthy Cities awarded a planning grant to Chicago to fund environmental justice organizations in co-developing the community air monitoring network strategy identified as part of the VCA and the EJ Action Plan. Through the planning grant, the Chicago Department of Public Health (CDPH) met with Center for Neighborhood Technology, LVEJO, N4EJ, CEJN, SETF, PCR, and Blacks in Green to focus on the network design and development.
- Dr. Serap Erdal at the UIC School of Public Health (SPH) received two grants in 2023 (a federal grant through Congressionally Directed Spending Program) and 2024 (a grant from RHP/ComEd Exelon) to establish a sensor-based air monitoring network in environmental justice communities in Chicago.

- The two institutions (CDPH and UIC SPH) decided to collaborate on creating a single and unified public infrastructure for air monitoring in Chicago. They collectively purchased more than 300 Clarity solar-powered sensors that measure levels of fine particulate matter (PM_{2.5}) and Nitrogen Dioxide (NO₂) in ambient air from their respective grants.
- **How was the Chicago Air Sensor Network Advisory Board formed?**
 - Through an open call, eligible community-based organizations were able to submit letters of interest to participate on the Advisory Board. Organizations were selected based on a review by the respective Healthy Chicago Zone Regional Leads, the Illinois Public Health Institute, and members of the CDPH team. Illinois EPA and Cook County Department of Environment & Sustainability represent the regulatory community of Chicago. CDOT is a critical partner supporting the installation and maintenance of the network.
- **What type of air sensors are being utilized in the Chicago Air Sensor Network?**
 - The Chicago Air Sensor Network is comprised of 277 [Clarity Node-S sensors](#).
- **What are different types of air sensors and air monitors in our city, and how does the Chicago Air Sensor Network fit in?**
 - Chicago has multiple types of air monitoring equipment located throughout the city that are maintained by different entities and have differing performance characteristics; therefore, the data cannot be combined to enable an integrated assessment. The different types are:
 - Facility or fenceline monitors are required at certain permitted industrial facilities, with information submitted to CDPH.
 - Regulatory monitors are operated by IL EPA and the Cook County Department of Environment and Sustainability with oversight by the U.S. Environmental Protection Agency Air and Radiation Program. There are approximately six federal air monitoring sites in Chicago. Federal Reference Monitors (FRMs) and Federal Equivalent Monitors (FEMs) are regulatory-grade air monitoring

instruments specifically designed to assess compliance with the health-based National Ambient Air Quality Standards (NAAQS) by the U.S. EPA.

- Low-cost sensors such as PurpleAir or AirBeam are operated by residents, organizations, and researchers to help identify hot spots and understand relative air quality levels and trends across Chicago neighborhoods using non-consistent monitoring protocols employed by users.
 - The Chicago Air Sensor Network *Clarity Node-S* sensors deliver high-quality data when properly tested and maintained. However, these sensors are not regulatory-grade instruments and cannot be used in support of regulatory decision-making (e.g., permitting, compliance assessment with NAAQS, or enforcement).
 - As part of the Chicago Air Sensor Network, UIC SPH has also installed six Black Carbon sensors to gather more detailed data on particulate matter...
- **What types of pollution are measured by the Clarity air sensors in the Chicago Air Sensor Network?**
 - The 277 *Clarity Node-S* sensors measure concentrations (or levels) of PM_{2.5} and NO₂.
 - **How high are the sensors placed? Are the air sensors connected to a power source?**
 - The sensors are placed 16 feet above the ground on light poles and operate on solar power.
 - **How far can the air sensor measure?**
 - The sensors do not capture a specific radius. Instead, they regularly measure PM_{2.5} and NO₂ as the air mass passes through the sample inlet of the sensor instrumentation.
 - **Does weather affect the air sensor measurements?**
 - *Clarity Node-S* sensors are rugged, weatherproof devices for seamless operation and minimal maintenance even in remote locations. Clarity sensors are located throughout the world in locations with wide

variations in climates like Finland, Columbia, Ghana, India, Qatar and Australia.

- **How did we decide where to place the sensors?**

- The Chicago Air Sensor Network includes 277 sensors across the entire city. Each ward and community area has at least one sensor.
- Air sensors were installed on a grid network using a regulatory and technical approach documented under the [Clean Air Act](#), the . The network is designed with a 0.87 mile x 0.87 mile grid size in communities with higher Chicago Environmental Justice (EJ) Index scores, developed as part of the Cumulative Impact Assessment project in 2023. A larger grid size of 0.93 mile x 0.93 mile was used for the remaining areas. This resulted in 64% of the total number of sensors being located in communities with higher Chicago EJ Index scores, or more burdened by pollution and most vulnerable to its effects.
- Specific light poles were selected closest to the grid locations in community meetings across the city with 13 community organizations.
- CDOT criteria for installing equipment on light poles were also taken into account in sensor placement across the city. Sensors were placed on light poles that met CDOT's criteria for safety while honoring community voices for sensor installation locations to the maximum extent possible.

- **How have community organizations been involved in developing the air sensor network and the placement of air sensors?**

- In the years leading up to the establishment of the Chicago Air Sensor Network, community partners were actively engaged in the development of the network through input and partnership with project leads at both UIC SPH and CDPH.
- Throughout Summer 2025, 13 community organizations on the Advisory Board provided feedback for light pole placement in their respective Zip Codes.
- The Advisory Board is contributing to the development and design of the public data visualization platform, and air quality educational materials and community training.

- **How long will the sensors be collecting data?**
 - The sensors will be operational for five years (i.e., through 2030). CDPH, UIC SPH, and the Advisory Board are actively exploring opportunities for sustainability beyond 2030.
- **How much has been invested in the Chicago Air Sensor Network?**
 - As of October 2025, the City of Chicago has invested \$1.3 million dollars to fund the purchase and installation of air sensors as well as funding EJ Seed Grants to support the Advisory Board.
 - UIC SPH's project leads and team have invested approximately \$2.9 million from two grants to purchase the sensors and support the work on establishing a Clarity-based air quality sensor network for Chicago residents.
- **What are the major emission sources for air pollution in Chicago?**
 - Major air pollution sources in Chicago include mobile sources (i.e., transportation sources such as cars, trucks, planes, and trains) and stationary sources (i.e., industrial facilities that burn fossil fuels like factories).
- **Causes: What causes nitrogen dioxide in the air? What causes particulate matter?**
 - Nitrogen dioxide (NO₂) primarily gets in the air from the burning of fuel, from transportation sources (cars, trucks) and also industrial sources (e.g., factories, etc). Secondarily, NO₂ is also formed in air when nitric oxide (NO) from these air pollution sources reacts with other pollutants in ambient air such as ozone. NO₂ along with other NO_x reacts with other chemicals in the air to form both particulate matter and ozone. Basic information about NO₂ can be obtained via: <https://www.epa.gov/no2-pollution/basic-information-about-no2>
 - Particulate matter is emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires. Most particles form in the atmosphere because of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides, which are pollutants emitted from industries and automobiles. Basic information on fine particulate matter

(PM2.5) can be obtained via: <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>

- **How do these air pollutants affect health? Which community members are most sensitive to air pollution?**
 - Breathing air with a high concentration of NO₂ can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms. Longer exposures to elevated concentrations of NO₂ may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO₂.
 - The size of particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream. Exposure to such particles can affect both your lungs and your heart. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including premature death in people with heart or lung diseases, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.
 - The following groups of people are ‘sensitive populations’ who are more vulnerable than others to air pollution: children, older adults, individuals who are pregnant and their fetuses, people living with asthma, COPD and other chronic diseases, people of color, people who have lower income, people who live or work near sources of pollution, and people who work outdoors.
- **How will the sensor data be used?**
 - The *Clarity Node-S* sensors will provide neighborhood-level air quality data to the public in a way that is useful and easy to understand so that Chicagoans can be equipped with information on how to limit or minimize their exposures to air pollution as a preventative measure for any

potential health impacts (e.g., not exercising outdoors and limiting outdoor activities during poor air quality events).

- This data will also be used as part of CDPH's ongoing health surveillance activities (which can be found on the [Chicago Health Atlas](#)).
- UIC SPH will analyze the data to further community-based research and disseminate findings to both the technical, scientific, and regulatory community and the public at large.
- **Who will have access to the data collected by the sensors?**
 - Everyone. The data will be summarized in a forthcoming dashboard and available for download via the City of Chicago's Open Data Portal.
- **Will data be available for each sensor and each part of the city?**
 - Yes, the data will be available for each of the 277 grid points across the City.