

Assessing Urban Air Quality

What does this project do?

Urban areas have many sources of air pollution. Increasingly, urban residents are concerned about the effects of air pollution on human health. Understanding small-scale differences in air pollution is essential to minimizing exposure to harmful air pollutants, particularly among vulnerable populations such as children and the elderly.

The 2017 LCCMR recommended and Legislature appropriated \$700,000 to install new, high-tech low-cost sensors, or monitors, in St. Paul and Minneapolis. These monitors can measure multiple types of harmful air pollution at once, and can sense small-scale differences in various air pollutants.

What work has been done so far?

- A network of 44 air quality sensors installed across St. Paul and Minneapolis.
- These sensors monitor fine particles, ozone, nitric oxide, nitrogen dioxide, sulfur dioxide and carbon monoxide.
- There is at least one monitor in each ZIP code in these two cities, and some larger ZIP codes have more than one monitor.
- In St. Paul, most of the air quality monitors are placed on light poles in school parking lots.
- In Minneapolis, these sensors are located on Xcel energy wooden light poles in neighborhoods.
- Data measured by the monitors is collected at MPCA and displayed on our website.

What questions will be answered by this project?

- Are there differences in pollution concentrations between zip codes in the urban core?
- Are there specific areas with unusually high concentrations?
- Are there similar patterns of high pollution concentrations across zip codes as high asthma hospitalization rates?

What are the expected outcomes?

The innovative monitoring approach of this program is replicable, and will achieve three objectives:

- Improve understanding of air pollution variability within densely populated areas. This information will be used to evaluate pollution reduction opportunities, and to compare with data on population vulnerability and health outcomes.
- Evaluate the use of new technologies in air pollution sensors as an innovative, cost-effective monitoring strategy.
- Expand the availability of ambient air quality data to inform decisions, especially regarding public health improvement opportunities.

What are the health impacts of these air pollutants?

Pollutants	Sources	Health effects	Environmental effects
Sulphur Dioxide (SO ₂)	<ul style="list-style-type: none"> Industry, coal fired power plants Burning of high Sulphur fuels 	<ul style="list-style-type: none"> Respiratory illness Cardiovascular illness 	Precursor to acid rain – damages lakes, rivers, plants, buildings
Nitrogen Oxides (NO _x)	<ul style="list-style-type: none"> Industry Vehicles 	<ul style="list-style-type: none"> Respiratory illness Cardiovascular illness 	Nitrogen deposition leading to over fertilization and eutrophication
Particulate matter	<ul style="list-style-type: none"> Industry Vehicles 	<ul style="list-style-type: none"> Penetrate into lungs, asthma Finer particles can enter bloodstream 	Affects Visibility and AQI
Carbon Monoxide (CO)	<ul style="list-style-type: none"> Vehicles 	<ul style="list-style-type: none"> Headaches Fatigue 	Contributes to formation of smog
Ozone (O ₃)	<ul style="list-style-type: none"> Secondary formation from reactions of Nitrogen oxides and VOCs 	<ul style="list-style-type: none"> Respiratory illness Eye and throat irritant 	Reduced crop production and forest growth. It is a smog precursor

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