American Lung Association

Something in the Air

How Communities Are Tracking the Air They Breathe

A "State of the Air" Supplemental Report

EXECUTIVE SUMMARY

Executive Summary

"Something in the Air" is a report by the American Lung Association that seeks to broaden how air pollution monitoring is understood and used across the United States. Through a range of approaches, air quality monitoring provides communities with the information needed to track conditions, measure progress and advocate for solutions to persistent air pollution problems affecting their health. This report highlights community partners who have worked alongside agencies to interpret pollution data and translate it into information that informs residents, policymakers and the public.

This is the third report on air monitoring technology issued by the Lung Association. The first two "Something in the Air" reports used satellite data to identify broad gaps and localized pollution trends from above; this next phase moves to the ground, where community-driven monitoring and participatory science are increasingly essential complements to the regulatory system. While the U.S. Environmental Protection Agency's (EPA's) monitoring network remains the foundation for assessing compliance with the National Ambient Air Quality Standards (NAAQS), it is designed to characterize regional air quality trends rather than neighborhood-scale conditions, block-level variations, short-term emission spikes and local exposure patterns.

Across the United States, communities are building collaborative hyperlocal air monitoring networks to better identify pollution hotspots overlooked by traditional monitoring systems. Community-based monitoring fills these gaps by pairing transparent, publicly accessible data with defined decision pathways rooted in scientific expertise, cross-agency coordination, trust and shared decision-making—turning real-time information into data at the local, state and federal levels. This capacity is built through low-cost sensors, mobile monitoring and other research tools that translate data into tangible protections, enabling communities and agencies to pinpoint priority areas and apply evidence to planning, mitigation and oversight actions for cleaner air.

This report focuses on three air pollution sources for which community-generated data has become essential: wildfire smoke events, heavy-duty transportation corridors and point-source emissions such as industrial facilities and power plants. Drawing on six case studies—two for each source—the report shows how real-time monitoring reveals fine-scale pollution patterns and supports transparent data use, collective governance strategies and community resilience through coordinated response. Interpreted alongside lived experience and supported by regulatory and public health partnerships, these programs can catalyze policy interventions shaped by local priorities.

Each source featured in the case studies presents a distinct pollution dynamic that requires tailored monitoring strategies. Wildfire smoke highlights the value of rapid, hyperlocal information during fast-moving events, while heavy-duty traffic reflects continuous, corridor-based emissions that influence daily exposure. Point-source pollution illustrates persistent, facility-driven emissions concentrated in the same neighborhoods, day after day.

Wildfire Smoke

The first case study focuses on wildfire smoke—now one of the nation's most widespread and severe air quality threats. Smoke shifts rapidly, traveling hundreds to thousands of miles and creating sharp neighborhood-scale exposure gradients that regional monitoring networks are not designed to capture in real time—especially in rural valleys, small towns and tribal communities. The first case documented here is Methow Valley Citizens Council's Clean Air Methow's Clean Air Ambassadors program in Washington, where residents were trained to steward more than 35 PurpleAir $PM_{2.5}$ sensors across a 60-mile rural valley—building one of Washington's largest community-based sensor networks for smoke response. The second, the PurpleAir in Schools Program in Montana, enrolled more than 100 schools within its first two years, with over 78 installing and operating paired indoor and outdoor air sensors to guide school-based responses during smoke events.

> "Regulatory monitors are essential, but they're expensive and designed to represent regional conditions. Low-cost sensors give us a practical way to understand what's happening at the community level and to deliver information with real, lifesaving potential."
> — **Kelly Dorsi**, PhD, Section Supervisor, Air Research & Monitoring, Montana Department of Environmental Quality

Heavy-Duty Traffic

The second case study addresses heavy-duty traffic pollution—a daily, cumulative burden that disproportionately affects neighborhoods located near freight corridors, ports, railyards, warehouse districts and major trucking routes. Diesel emissions create sharp, block-level pollution gradients and short-term spikes that are rarely captured by regional monitoring networks designed for compliance, not local exposure. Community-based monitoring has been extremely effective at identifying idling hotspots, truck rerouting needs and differences in exposure across residential blocks. This case study profiles the Albany's South End Neighborhood Air Quality Initiative in New York, where community input shaped traffic counts and combined fixed-site and portable monitoring to capture near-road pollution along heavy duty truck routes. It also profiles the West Oakland Environmental Indicators Project, which used data from mobile and stationary monitoring to guide investments in local pollution reduction projects, measurably reducing harmful air pollution and driving policy action.

> "Transparency alone isn't enough. Communities need tools and support to analyze and use the data, especially when monitoring is meant to inform decisions, not just document problems." — **Randi Walker,** Chief, Air Toxics Section, Division of Air, New York State Department of Environmental Conservation

Point-Source

The third case study focuses on point-source pollution in fenceline communities—areas adjacent to heavy pollution sources like refineries, petrochemical plants, power plants and other heavy industrial operations. Unlike regional background pollution, point-source emissions can occur in short bursts tied to flaring, equipment failures, leaks or nighttime operations—conditions not always adequately captured by regulatory monitors. Community-led monitoring

efforts in these areas have revealed the scale and frequency of emissions events, strengthened permitting and enforcement actions and generated data to inform emergency response and health-protective planning. The two cases examined include the Cultivando AIRE Project in Commerce City, Colorado and Sensing Air Justice in Rubbertown: Louisville, Kentucky. The Cultivando AIRE project documented emissions of 129 toxic chemicals and used those findings as a foundation for community advocacy and regulatory engagement. The Sensing Air Justice project conducted resident surveys and deployed low-cost sensors, integrating the data into broader community strategies to strengthen public participation, transparency, monitoring practices, enforcement and emergency preparedness.

> "The first goal was to give families tools to make decisions for themselves—especially families with children with asthma. The second was to push decision-makers to improve permits and policy." — **Megan Poole**, PhD, Assistant Professor of Rhetoric & Writing, University of Louisville

Taken together, these case studies demonstrate how hyperlocal monitoring is reshaping who can access data, who can act and when—accelerating decision making and enabling action in response to changing conditions. In rural communities affected by wildfire—especially those centered around schools—localized smoke data can guide emergency response and protective decisions in areas not covered by regulatory monitoring networks. Along freight corridors, neighborhood-scale mapping has informed anti-idling enforcement, truck-routing discussions and targeted mitigation investments. In fenceline communities impacted by point-source pollution, community monitoring has strengthened permitting engagement, substantiated reports of episodic emissions and elevated the case for stronger oversight and enforcement.

Across all three settings, shared themes emerge: clearly defined monitoring goals; strong data quality assurance and quality control (QA/QC) with appropriate correction factors; transparent dashboards and data visualization tools; pollutant-specific measurement strategies; and collaborative governance structures that promote shared data use and align monitoring with local decision making priorities. Community storytelling and lived experience—embedded in advocacy efforts and sustained engagement—transform data into credible evidence that shapes policy action. Rather than operating as standalone data efforts, these projects demonstrate the resilience and power of community-owned monitoring—rooted in long-term stewardship, local leadership and relationships that sustain action beyond individual events or funding cycles.

Public, neighborhood-scale monitoring shortens the distance between exposure and accountability, creating real-time information sharing and response mechanisms across agencies and polluters alike. By redistributing decision authority beyond agencies alone, monitoring enables communities, schools, health agencies, academic institutions, research organizations and governments to act in parallel—enhancing overall capacity to improve air quality.

Sustained progress depends on coordinated action across four levels—federal agencies, states, local governments and individuals and community groups. The following, cross-cutting recommendations apply across all three case studies and are reflected within each report, with tailored actions drawn from engagement with local leaders on lessons learned.

Recommendations

Federal Government

- Implement and enforce science-based, health-protective NAAQS, including the 2024 updated PM$_{2.5}$ standard.
- Strengthen hazardous air pollutant standards and enforcement. Expand fenceline monitoring requirements to more stationary sources of hazardous air pollutants.
- Adequately fund state, local and tribal air agencies to sustain robust regulatory monitoring networks, including staffing, data platforms and infrastructure.
- Invest in dedicated, multi-year funding for community-led monitoring, supported across federal agencies (e.g., EPA, FEMA, USDA and others). Include investments in technical assistance hubs that provide calibration and collocation support, QA/QC protocols, quality assurance and data interpretation guidance. Support ongoing research into best practices.
- Develop guidance on minimum performance, documentation and transparency standards to integrate validated, community monitoring data into federal air quality decisions, including enforcement, inspections, permitting, compliance and rulemaking.
- Establish frameworks to utilize community-scale data for public health communications, emergency response and preparedness, and post-event evaluations.
- Building on the success of the EPA U.S. Fire and Smoke Map, improve and modernize federal data platforms to display validated and corrected community monitoring data alongside regulatory measurements. Permanently fund and expand federal wildfire smoke monitoring programs, including EPA's Wildfire Smoke Air Monitoring Response Technology (WSMART).
- Support cross-agency coordination among air agencies, transportation authorities, port and freight authorities and land-use and zoning regulators to integrate community monitoring into decision-making.

States

- Ensure stable, state-level funding streams, beyond short-term grants and projects, for community monitoring. Sustain cross-agency partnerships that build local expertise and tailor to local needs.
- Partner with universities, air agencies and research institutions to provide technical support—including sensor deployment, data hosting, calibration and validation, assessment and maintenance, data useability and hands-on training—for community, school and tribal monitoring programs.
- Integrate properly corrected community sensor data into dashboards, maps, public advisories and communication platforms that support incident-response systems, neighborhood-level messaging, school and outdoor activity guidance, emergency response decisions, post-event assessments and inclusion in state resilience planning.
- Establish frameworks that formalize community participation and transparency in air quality decision-making, including defining how community input informs agency actions and ensuring feedback loops between residents and decision-makers. Ensure a pathway for community-generated data to be used to identify high exposure areas.

- Use quality-assured community data to inform state permitting decisions, cumulative-impact analyses and targeted inspections, and formalize how neighborhood-scale monitoring feeds into state air quality programs to support enforcement screening, mitigation prioritization, emergency monitoring plans, transportation planning and land-use strategies. SIPs can remain anchored to regulatory monitoring for NAAQS compliance while using quality-assured community data to identify hotspots and better target where emission reductions can be applied.
- Support Tribal sovereignty in air monitoring by strengthening EPA State and Tribal Assistance Grant (STAG) support for tribal air programs, including sustained funding for staff, operations and data ownership and use.

Local Governments

- Commit sustained funding to support the full lifecycle of community air monitoring, including sensor maintenance and replacement, staff capacity and training, partnerships, public data platforms and ongoing engagement that links monitoring to public health and emergency response.
- Coordinate across cities, counties, regional agencies, public health and emergency planners and neighboring jurisdictions to align monitoring with pollution patterns, enabling residents and agencies to co-develop priorities, review data and guide mitigation strategies.
- Embed air quality monitoring into local emergency management and hazard-mitigation plans by establishing formal cross-department protocols that define how community sensor networks are used in public communications, emergency operations, recovery planning and future preparedness, require agencies to use real-time data to guide coordinated response during major pollution events, and document lessons learned to improve future decision making.
  - Wildfire smoke: Use data to guide decisions on outdoor activities, worker safety, school and childcare operations, ventilation and clean-air shelter activation.
  - Heavy-duty trucks: Apply data to inform truck routing, idling enforcement, curb management, port operations and roadway design.
  - Point-source pollution: Integrate data into investigations, permitting review, public comment processes and facility-level mitigation actions.
- Regularly review monitoring data to identify areas of elevated concentrations, dominant sources and exposure trends, and conduct after-action reviews following major events to refine communication, sensor placement, outreach and resource deployment.
- Preserve quality-assured community data for public comment and, when needed, legal review, strengthening the administrative record with real-world exposure evidence.
- Support community events and volunteer networks—including schools, faith-based organizations and health clinics—to engage residents as sensor hosts and data stewards.
- Use transparent, plain-language and multilingual reporting tools with visuals and maps to support public understanding and informed participation in policy discussions.

Individuals/Community Groups

- Collaborate with academic entities, public health organizations, government agencies and commercial vendors to secure multi-year grant funding support for deploying monitoring projects and sustaining staffing, data infrastructure and stewardship.

- Bolster community capacity and support through coordination with local schools, tribal, faith-based and neighborhood organizations in under-resourced or rural areas.

- Use publicly accessible air quality data, supported by cross-sector partnerships, to deliver clear findings, actionable requests and health-protective protocols to local municipal boards, school boards, commissions and decision-making bodies.

- Apply neighborhood-scale data to advocate for health-protective actions, including emergency alerts, clean-air shelter activation and smoke-day school and work adjustments, truck rerouting, idling restrictions, buffer zones near homes and schools, and stronger fenceline monitoring, permit modifications, targeted inspections, health symptom tracking and enforceable mitigation during permit renewals or expansions.

- Build data literacy by training local staff, volunteers, leaders and residents to interpret corrected data, document pollution events and communicate findings effectively, while establishing clear governance structures over roles, authority and data ownerships.

- Plan for the full data lifecycle and continuous improvement—from defining monitoring questions and selecting sensors to placement, calibration and maintenance; data collection, backup and useability; to quality assurance and sustained use of results.

- Document and apply lessons learned to improve communication strategies, locally tailored data models, resource deployment and long-term operation and sustainability.

- Maintain public-facing dashboards that integrate sensor data and forecasts with plain-language health guidance, designed to be mobile-friendly, multilingual and accessible to non-experts.

- Educate residents on local emergency preparedness and response protocols, including the communication channels used to deliver rapid public alerts during pollution events.

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55 W. Wacker Drive, Suite 1150 | Chicago, IL 60601 | Ph: 312-801-7630 | Lung.org