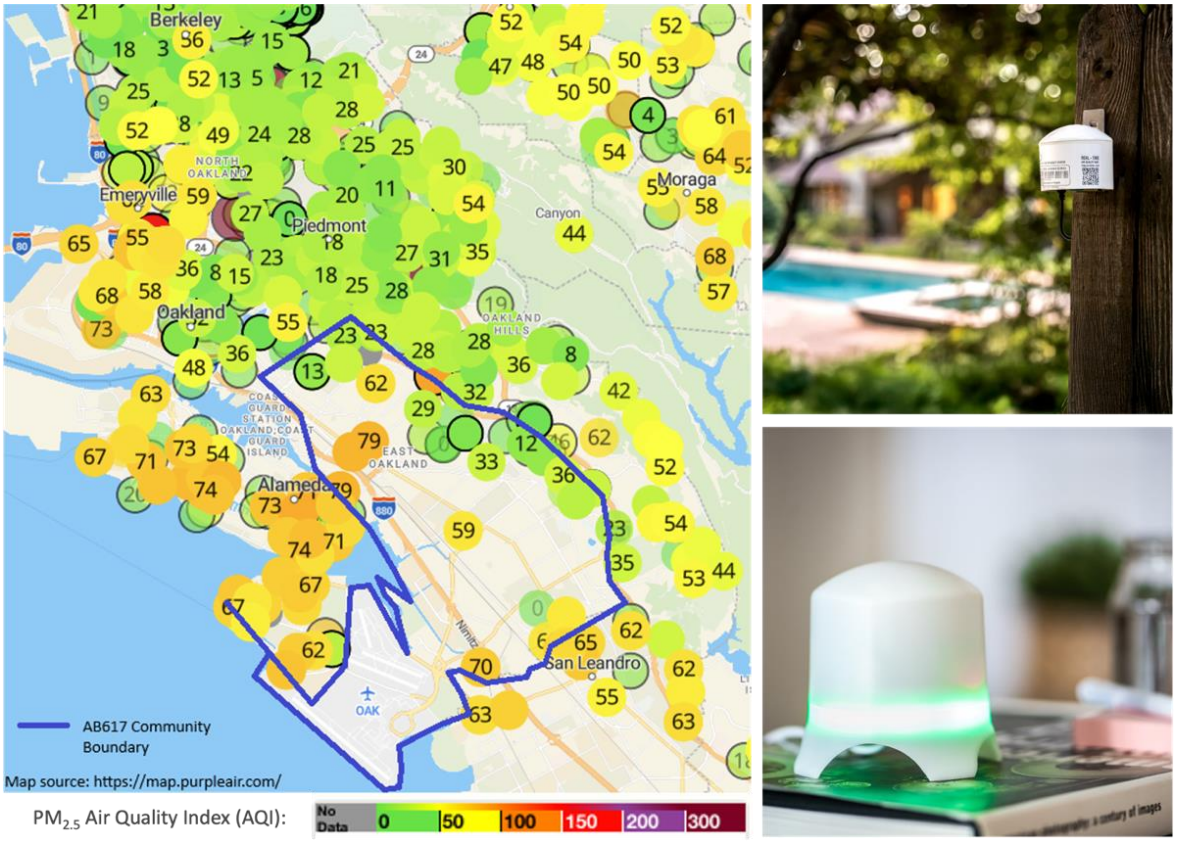
Air Monitoring Project in East Oakland:
Project Plan for Community-Based Monitoring Network

Background

In general, communities located near emission sources, like industrial facilities, on-road traffic, railways, and airports, experience higher levels of air pollution compared to other urban areas without these emission sources. These differences are not always captured by long-term ambient air monitoring stations that track air pollution levels and trends relative to air quality standards and require regulatory-grade instruments that are expensive to operate. These long-term air monitoring stations are typically limited in spatial resolution and are not meant to capture the variation in air pollution at the neighborhood level.

Communities for a Better Environment (CBE) have partnered with the University of California, Berkeley (UC Berkeley) and the Bay Area Air District (Air District) for the Air Monitoring Project in East Oakland (AMP East Oakland). With this project, we will collect more neighborhood-scale air quality data within East Oakland with a network of low-cost particulate matter (PM) monitors from PurpleAir. PurpleAir monitors are small, lower cost than regulatory-grade instruments (~$300 versus >$20,000), easy to use, and available for anyone to purchase. The monitors display their data on a real-time map that is open to anyone to look at PM air pollution levels across the world (https://map.purpleair.com). It's community science in action!



(Left) Current map of PurpleAir monitors in East Oakland versus the surrounding area, with the target study area defined by AB617 shown by the blue outline. (Right) PurpleAir Flex (top) and Zen (bottom) monitors that will be used in this study. Either model can be used indoors or outdoors, depending on the participant's preferences.

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East Oakland has very few PurpleAir monitors and is in many ways an air quality "data desert." PurpleAir monitors are an essential community resource to produce the real-time data needed to understand day-to-day air quality concerns, especially during acute, high PM pollution events like wildfires that are increasingly common in California. With AMP East Oakland, we will develop a community-based monitoring network to produce data to help better understand and quantify how PM concentrations vary across East Oakland.

Project Description

The AMP East Oakland study is a partnership between CBE, UC Berkeley, the Air District, and East Oakland community members. This project seeks to:

- Develop a more robust air monitoring network in Deep East Oakland
- Distribute air filters to community members that will mitigate and reduce PM pollution inside their homes
- Train community members to interpret air quality data and respond to air quality emergencies like wildfire smoke events
- Build ownership in air pollution monitoring and response to severe air quality events

We will build a network of PurpleAir monitors at 35 sites across East Oakland and will monitor ambient PM concentrations for 1 year. The project will center on the community boundary defined through the East Oakland Community Emissions Reduction Plan process under Assembly Bill 617 (AB617), which includes the 94621, 94603, and 94601 ZIP codes.

Five of the 35 monitoring locations will be at Oakland Unified School District (OUSD) schools. Thirty locations will be at residential homes or community centers, for which we will recruit hosts to receive a PurpleAir monitor that will be placed outside their home. Residential hosts will have an option to receive a second PurpleAir monitor that will be placed indoors, as well as receive an indoor air filter (Levoit Vital 100, pictured left) and a stipend for their participation. As part of their participation, these community members will be trained to monitor and respond to air quality changes within their homes, as well as to air quality emergencies like wildfire smoke events. At the end of the 1-year study, participants will be able to keep their air filter.

A Levoit Vital 100 air filter that will be given to residential participants, including a spare filter. If used continuously, we estimate that it will cost around $2–3 per week to operate.

Community engagement is a key element of this study. We will hold two training sessions to inform participants about their PurpleAir monitors and air filters, including how the monitors and filters work, how to use them, how to interpret air quality data on the PurpleAir platform, and

common indoor air quality impacts and how to reduce them. Over the course of the 1-year study, we will also hold quarterly informational sessions to discuss the collected data and answer any participant questions. These informational sessions will include data summaries, suggestions for how participants may be able to improve their indoor air quality by using their air filters, and time for participants to ask questions.

Eligibility Requirements for Participants

To participate as a host of an indoor PurpleAir monitor and to receive an air filter, eligible households must:

- Reside in the study area that centers around the AB617-defined boundary that includes the 94621, 94603, and 94601 ZIP codes (see blue outline in the map pictured above)
- Have at least one residing adult (≥18 years old) who is able to consent on behalf of their household
- Plan to live in the study area during the 1-year monitoring study

There will be no exclusion criteria based on income, housing type, or health- and indoor-air-quality-impactful behaviors like smoking indoors.

Installation Requirements for PurpleAir Monitors

To host an indoor PurpleAir monitor and receive an air filter, eligible households must have:

- Accessible WiFi that the research team can connect the PurpleAir monitor to and use to transmit data
- An accessible outlet in either the communal living room or a primary bedroom that a power strip can be plugged into with the PurpleAir monitor and air filter—host can choose the location based on which room best fits their expected use and with help from the research team
- A non-floor surface like a wall or tabletop that has at least 1 foot of clearance on either side and is away from any vents, indoor PM sources like candles or incense, and windows that may be opened—the air filter will be placed in the same room as and at least 3 feet away from the indoor PurpleAir monitor

For locations hosting an outdoor PurpleAir monitor, sites must have:

- Accessible WiFi that the research team can connect the PurpleAir monitor to and use to transmit data
- An accessible outdoor outlet that the PurpleAir monitor can be plugged into—we will have extension cords and outlet splitters, if needed
- A wall or surface with a least 1 foot of clearance on either side and is away from any vents or outdoor PM sources like BBQs or generators—host can choose the installation location with help from the research team

PurpleAir monitors will be connected to the host's WiFi to transmit data to the cloud-based server and publicly available map (https://map.purpleair.com). The monitor's name on the map will be generalized (for example, CBE1-indoor and CBE1-outdoor) and not specific to the

participant. The location of the monitor on the publicly available PurpleAir map will be limited to the nearest intersection, rather than specific to the address of the participant.

Expected Project Outcomes

The goal of this project is to increase the accessibility of PM air monitoring data in East Oakland. This data will support the ongoing community-led advocacy work and efforts to build community power, mitigate air pollution, and create healthy and sustainable environments. This informational monitoring project will provide essential information for the development of effective strategies for reducing air pollution exposure.

We expect that this study will:

- Expand air monitoring efforts in East Oakland to better track pollution levels
- Generate data that can be used to characterize trends in outdoor PM levels across the neighborhood over the course of a year
- Empower East Oakland residents with the skills to understand air quality data and take action during air quality emergencies, such as wildfire smoke events
- Demonstrate the effectiveness of air filtration devices in improving indoor air quality compared to outdoor air quality, especially during extreme air pollution events
- Enable participants to use real-time PM data to engage in informed advocacy, empowering them to fight for cleaner air for themselves and their community